
ART
A New Alternative
Investment Vehicle?
AP

Finance & Strategic Management - Department of Finance

MASTER THESIS

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A New Alternative Investment Vehicle?

An analysis of Art as an investment opportunity for institutional investors

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*Title Page: No. 5, 1948 by Jackson Pollock
http://news.bbc.co.uk/nol/shared/spl/hi/pop_ups/06/entertainment_enl_1162542063/img/1.jpg

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EXECUTIVE SUMMARY

Encouraged by substantial media and public attention as well as the continuous quest for new alternative forms of investment, the study at hand sought to answer the question whether Art presents an investment opportunity for institutional investors.

To investigate this issue it was first desired to gain a general understanding of the Art market, its drivers and requirements as well as financial profitability in order to determine the general appeal of paintings as an asset class. In a second step, the stance of institutional investors and specifically Danish pension institutions was taken to scrutinize further the attractiveness of paintings as an instrument in institutional portfolios.

From those observations it had to be concluded that paintings are rather disappointing from a financial perspective, appear quite unattractive to and unsuitable for pension institutions if a direct holding and passive approach is desired. The most promising feature of Art (possible role as a portfolio diversifier) is overshadowed by negative aspects, above all the weak and non-competitive average financial performance of paintings which is most striking if transaction costs and other Art-typical expenses are provided for. Furthermore, volatility of returns, substantial illiquidity and valuation difficulties present sources of risk depressing further the attractiveness of Art. In the context of pension portfolios, Art encounters additional obstacles which can vary with the type of pension scheme that is considered and range from administrative concerns to discrepancies with investment/risk-management strategies and regulatory stipulations. Foremost, however, paintings do not seem to be able to compete with other financial instruments and to provide a benefit in terms of return or diversification which would render it worthwhile to take the financial risk or jeopardize institutions' reputation.

Evidently, without any further action and attempts to work on the deficiencies of Art investments, paintings prove to be unsuitable instruments for pension institutions and possibly all types of institutional investors. However, the peculiar conditions and also inefficiency of the Art market give rise to different opportunities along the Art investment process to improve the financial performance and mediate other concerns about the asset class. It could be problematic for pension institutions themselves to gain the expertise and skills necessary for exploiting those opportunities (at least in the short-run) but specialized Art investment funds which claim to provide over critical know-how and strive to take a very active approach could present a remedy with this regard. Though, Art funds still have to prove their capabilities and at least until then it appears more reasonable for pension institutions to draw on other alternative investment vehicles which present themselves in the highly sophisticated investment universe.

1. INTRODUCTION

1.1 Foreword

Christie's Impressionist and Modern Art auction in November 2006 - "$491 million sale shatters Art auction record" [1]. Contemporary Art sale at Christie's New York in May 2007 - "$384,654,400 total smashed all records"[2]. "Collectors dropped a historic $362 million"[3] - with Sotheby's record Contemporary auction in May 2008, the Art market keeps booming.

Such news heralding soaring and ever new record-high auction results reflect the increased interest in Art and enhanced activities on world-wide Art markets that could be experienced over the last five years in particular. Constant coverage in media directs not only ever more attention of the general public but calls also for the awareness of financial investors who recognize the buzz surrounding Art and interpret the significant price increases as a promise for potential profits. Especially given the current state of markets - decreasing returns on traditional assets accompanied by enhanced volatility as well as a cooling down of the performance of Private Equity or Hedge Funds - the financial world is constantly seeking for new "alternative assets and sophisticated solutions to reap high returns while minimizing risk"[4]. Thus, the question is whether Art represents such a new alternative form of investment and provides superior returns as one might expect from following the enthusiastic reports in the media.

However, it needs to be acknowledged that the Art market is distinctive from other markets and follows very different rules than any other common financial instrument: taste and individual perceptions are at the very core of Art, irrationality seems often to govern market developments and other intricacies pose complex challenges to investing. At the present time, professional investors seem to have largely refrained from entering the Art market except for the prominent example of the British Rail Pension Fund in the 1970s. The field is currently dominated by wealthy individuals and also "international institutions"[5] like corporations or banks which do not invest for financial motives but primarily for the purpose of collecting. Clearly, this raises the issue for which reasons Art and paintings have so far not been considered as a financial instrument, a behaviour standing in stark contrast to the prevailing sentiment.

[1] Vogel (2006) about Christie's New York Impressionist and Modern Art auction in November 2006
[2] Thornton (2007) about Christie's New York Post War and Contemporary Art sales in May 2007
[3] Wong (2008) about Sotheby's New York Contemporary Art auction in May 2008
[4] Campbell (2008), p. 78
[5] Campbell (2004), p. 7

Therefore, it is in order to investigate more thoroughly what the true financial attractiveness of Art is and in how far it should be regarded as a new investment opportunity for professional, i.e. institutional investors.

1.2 Research Question

In line with the previously described reasoning, the research question guiding the analysis of the paper at hand shall be the following:

Is Art an investment opportunity for institutional investors?

In order to answer this overall research-question a thorough understanding relating to different subject areas has to be developed and a set of subordinated issues be investigated:

- What are the **peculiarities of the Art market** and **critical determinants of Art value**?
  What are the associated implications for the **general attractiveness of Art** as an asset class?
- What are essential **investment criteria and concerns of institutional investors** applied in the asset allocation process of institutional portfolios?
  How does **Art perform against those criteria** and resulting from this, what are
  a) appealing features of Art in the context of institutional portfolios?
  b) deterring factors representing barriers to the adoption of Art?
- What could be different **strategies** to enhance the value of Art investments, reduce existing barriers and thereby **improve the overall attractiveness** of Art to institutional investors?

1.3 Delimitations

1.3.1 The Subject of Art

The study at hand aims to assess the potential attractiveness and suitability of Art or, more specifically, Fine Arts as an investment instrument. Fine Arts refer to any Art "produced or intended primarily for beauty rather than utility"[6] and can embrace as diverse Artistic forms as paintings, drawings, sculptures, prints or photography but also music or theatre. The focus of the

[6] The American Heritage® Dictionary of the English Language (2008): 'Fine Art'

following examination shall lie on paintings as it accounts for almost two-thirds of all auction turnover (75.7% in 2006[7]) and therefore represents by far the largest category. Moreover, paintings are most prominent in media and have so far also been in the centre of interest of most academic research, thus providing a solid base of information for the investigations. The analysis will consider the characteristics and performance of paintings on aggregate but shall also distinguish between specific sub-segments of Old Masters (OM), Modern and Contemporary (Cont) paintings if appropriate in order to illustrate their different impact.

1.3.2 Perspective of Institutional Investors

In order to assess the attractiveness of Art as a financial vehicle it was decided to take on the perspective of **institutional investors**. Institutional investors can refer to a variety of different organizations as, for example, pension funds, insurance companies or mutual funds. All those organizations accrue considerable cash reserves from clients or participants which they need to invest profitably on behalf of those clients in their role as a fiduciary.

Two distinguishing characteristics render it particularly suitable/sensible to analyse the issue at hand from their point of view. Firstly, in contrast to private individuals institutional investors can generally be assumed to follow a **strict financial logic** in their activities. When selecting from different alternative investment vehicles, the institutions can be assumed to focus solely on financial features which are supportive in achieving their respective organizational goals and fulfilling their fiduciary tasks. Applying their portfolio selection criteria to Art shall help distinguish attractiveness for financial reasons from any possible aesthetic and very personal appeal.

Secondly, institutional investors are regarded to be **financially sophisticated and knowledgeable**. With investing as a core activity, they usually follow financial markets closely and provide over extensive understanding of the related intricacies. Given such experience with a variety of financial instruments it seems reasonable that institutions might relatively easily develop a similar expertise in the realm of Art, too. That would allow them to adequately identify pertaining risks and opportunities and thereby verify any inherent financial value.

In order to narrow the scope of investigations the analysis shall focus on pension institutions and emphasise in particular the representatives in the Danish pension market. **Pension institutions** take on a very prominent and powerful role among institutional investors and are generally considered major players on world's financial markets as demonstrated by the amount of assets under their

[7] ArtPrice (2006), p. 4

management ($22,702 billion AUM on a global scale in 2006[8]). Since pension systems across different countries are diverse it is very difficult to make generalizations or to fully explain their respective implications for the investment strategies in the scope of this paper. Therefore, it will be refrained to elaborate on the concepts applying to the **Danish retirement-income regime** and the resulting effects on the investment behaviour of local pension institutions. Especially, it shall be focussed on the Danish pension players operating in the so-called 2nd pillar of occupational pension plans and the possible impact of two factors on their investment preferences: on the one hand, the nature and characteristics of different pension plan types; on the other hand, stipulations of the Danish regulatory framework. Other possible determinants of portfolio choices, as for example tax issues, might as well be of importance but shall not be discussed here.

1.4 Structure of the Thesis

The analysis is structured into three main subject areas reflecting the themes indicated by the sub-elements of the research question and the delimitations specified before.

Firstly, **Section 2** will present different players, distinguishing characteristics as well as important dynamics of the market for paintings. In this context it is also in order to assess the performance of Art on typical financial evaluation criteria (return, risk and diversification), especially in comparison to other asset classes. Overall, this section is intended to provide a **basic understanding** of the requirements for undertaking investments in this area and give an initial idea about possible key success factors or possible impediments.

Secondly, **Section 3** emphasises the perspective of Danish pension institutions and the considerations or principles they employ when composing portfolios. In particular, it shall be investigated how the nature of different types of pension plans as well as stipulations of the Danish legislation influence aspects as retirement income objectives, investment or risk-management strategies which in turn guide asset allocation decisions. Having pinpointed in this manner overall preferences it shall be elaborated in how far paintings can accommodate those requirements and which factors might render them especially suitable or unacceptable for pension portfolios. Thus, this section shall identify a **list of obstacles** stemming from the idiosyncratic characteristics of paintings or the Art market as well as the complex investment criteria of Danish pension institutions. The preliminary assumption underlying this part of the analysis is that institutions would invest directly so that the identified barriers relate mostly to this form of investing.

[8] Maslakovic (2007)

Section 4 will be devoted to the investigation of different approaches by which means previously identified barriers might be reduced and overall performance of Art as investments be enhanced. On the one hand, it shall consider and critically assess strategies of active management designed to increase the value of paintings or decrease the associated costs in order to improve the overall profitability of paintings. On the other hand, Art investment funds will be contemplated as an alternative mode to direct holdings for participating in the Art market and pertaining strength or weaknesses associated with doing so be analysed. In this manner, the section shall deliver a **model for direct investment activities** or a **guideline for indirect investment approaches**, respectively. Lastly, **Section 5** shall conclude the findings of the preceding sections and - drawing on those results - provide a final assessment of the attractiveness of paintings as an investment vehicle for pension institutions. Moreover, the new contributions of the study at hand shall be highlighted and points for future research be outlined.

1.5 Research Design

As should be evident from the discussion of the research question and the previously presented structure, the three main sections of the analysis serve different purposes. They are designed to explore different aspects and contribute varying insights to the process of answering the overarching research question of whether Art could present an investment opportunity to institutional investors. Hence, the research purpose for each part and accordingly also the methodology employed, differ (see Table 1).

Table 1: Research Design

	Research Purpose	Research Approach	Data Type	Data Source
Section 2: The Art Market	• Basic understanding of Art market • Generally attracting or deterring features of Art investments	descriptive	qualitative and quantitative	secondary
Section 3: Institutional Investors	• Comprehensive list of barriers to adoption of Art investments from pension institutions' perspective (explaining current deterrence)	explanatory	qualitative	secondary and primary
Section 4: Active Management Strategies	• Strategic recommendations concerning mediation of obstacles • Guidelines for direct and indirect investments in Art	prescriptive	qualitative	primary

It should be emphasized that that the study at hand is **not** designed as a **quantitative research** with the purpose of testing existing theory. Here, it is rather desired to explain institutional asset allocation decisions and to infer from this the possible appeal of Art as a financial instrument. Therefore, elements of traditional financial and investment theory shall be applied and combined with insights into the conditions of the Art market and the pension industry. Those insights are obtained by means of **qualitative research** methods, particularly the analysis of documents and materials as well as in depth interviews with experts as suggested by Marshall and Rossman (1998)[9]. Ultimately, the information gathered and conclusions drawn shall serve as basis for a set of policy recommendations.

1.5.2. Data: Types and Sources

The information and data necessary for the investigations in the different parts of the research vary substantially with regard to their amount and availability or accessibility, respectively. It has to be recognized that the Art market is a very specialized field, characterized by certain opaqueness and informational asymmetry which influences the type of data obtainable.

In **Section 2**, the largely descriptive presentation of history, structure and other characterizing features of the paintings market relies mainly on qualitative information from secondary sources. As Art has enjoyed considerable public attention in recent times it has attracted interest of various parties willing to contribute to the field from their point of view. Therefore, information is available in various forms ranging from academic literature to newspaper articles or new media as Internet blogs - all of which were sighted, reviewed and processed to provide a comprehensive but qualified picture of the market and its dynamics. Previous academic research was especially consulted to develop a theoretically thorough framework for the analysis of financial characteristics. It was then drawn on quantitative price data of different asset classes to conduct the pertaining calculations.
Section 3, which seeks to explain the current non-adoption of or resistance of Danish pension institutions towards Art investments, rests on qualitative data from both secondary and primary sources. On the one hand, information on pension plan types, regulation and general portfolio theory builds the basis for the development of possible arguments in favour and against Art investments. On the other hand, interviews with practitioners of Danish pension institutions are utilized to obtain insight into the attitudes, concerns and perceived obstacles. This shall help substantiate the importance of theoretically identified factors and thereby guide the analysis as well

[9] Marshall & Rossman,(1989)

as validate the resulting findings.

Due to the absence of previous research, the strategies and recommendations presented **in Section 4** are entirely based on the insights gained from the preceding sections as well as primary information obtained from interviews with Art experts. Drawing on their experience and insider knowledge the latter can assist in identifying possible value drivers of Art investments and evaluating the potential of suggested active management strategies.

1.5.3. Data: Methods of Collection

As stated before, **secondary data** was gathered from various sources covering different fields of interest and types of media. Though increasing, the currently still comparatively limited amount of secondary literature on the paintings market allowed for an almost complete review. In contrast to that, literature on pension systems and general portfolio theory is relatively abundant and an emphasis was placed on pieces elucidating conditions in Denmark. Though, research explicitly investigating the portfolio choices and, particularly, the attitude towards Art is relatively rare.

Primary data was collected by means of interviews and conducted with a variety of interviewees selected according to their expertise in the areas of the Art market, Art as an investment vehicle and pension institutions. As there are relatively few participants in the global Art market all persons related to Art investment funds, Art investment advisories or auction houses were identified as possible specialist in this area and contacted. Regarding pension institutions, the delimitation of the research on the Danish market provided a first selection criterion for possible contact persons. The focus was further narrowed by considering the size of pension institutions and it was decided to call on the ten largest Danish pension institutions in terms of wealth or assets under management. Of those pension institutions, it was sought to address people working in the respective investment departments, providing at best about knowledge within alternative investments and highest possible responsibility. Appendix I gives a complete list of interviewees.

The interviews were preferably conducted in person when geographically possible or otherwise by telephone. Email-correspondence has been used both to introduce the topic as well as to clarify additional or newly-arisen issues. Two different sets of questionnaires were designed addressing the respective fields of expertise and information needed. In general, questions were designed in a semi-structure form which served a two-fold purpose: on the one hand, it helped ensure that all areas of interest and questions relevant to the overall topic were discussed; on the other hand, it provided leeway for the interviewees to speak freely about what they regarded as the most

important issues[10] and gave flexibility to the interviewers to pursue unexpected aspects brought up during the conversations. The latter aspect accommodated particularly well the explanatory and exploratory approaches chosen.

Once more it should be stressed, that the collection of primary data was undertaken to provide information for qualitative but not quantitative research. Therefore, the sample of interviewees might not comply with the strict requirements regarding size and representative composition as usually implied by a quantitative approach.

1.6 Limitations

1.6.1 Internal Validity

Internal validity refers to the correctness of the internal links between variables or concepts considered and concerns, in particular, the soundness of any cause-effect relationships claimed. This validity might be doubted with regard to two aspects in the study at hand.

Firstly, the **factors possibly determining pension institutions' portfolio choices** are limited to aspects belonging to the nature of pension plans and the Danish regulatory framework. Thereby, particular attention is devoted to a selected number of points which the authors deem to be of major importance and most influential regarding the asset allocation decisions. Although the previously described choices were guided and confirmed by statements of the interviewed expert panel of pension practitioners, other factors might have a stronger and more significant impact. This could refer to both other aspects within the fields of pension plan characteristics and regulation as well as factors from other areas, for instance, tax-issues. The affirmation from the practitioners could merely represent their personal judgement but not reflect the real conditions of decision procedures in pension institutions. Moreover, the issues put forward to constitute - from a supposedly rational point of view - barriers might simply disguise rather irrational motives grounded on personal inexperience and prejudices towards Art.

Secondly, the internal validity might be questionable regarding the aspects identified as **drivers of the Art market and the value of paintings** which in turn serve as a basis for the recommendation of active management strategies. As in the previous case, the drivers discussed in the present study are determined and verified through interviews with different experts, here from the Art world. However, the selected factors could represent only an incomplete picture or might not even be the source of the effect claimed. It is possible that other aspects of the very complex and opaque Art market play actually a more dominant role thereby

[10] Creswell, p. 121

1.6.2 External Validity

External validity ensures that identified relationships or research results can be generalized, that is transferred to other settings or translated into universally applicable theories.

The barriers and obstacles considered to negatively affect the attractiveness of Art as an investment vehicle are developed on the basis of the authors' theoretical deductions and insights gained from interviews with practitioners. The latter expert panel was utilized for the purpose of qualitative analysis which lends itself to provide useful but merely **anecdotal evidence**. According to Garson (2008), methods entailing narrative analysis come "at the expense of all the usual social scientific considerations (representative sampling, operationalisation of terms, use of controls, multivariate causal analysis)"[11]. This also applies to the case at hand where the **sample** of pension experts is only of **limited size and rather arbitrarily composed**. The target sample was small given the focus on only the ten largest pension institutions but was ultimately further diminished due to difficulties with gaining access to responsible people. Thus, empirical validity and representativeness are not given and consequently the transferability of findings to other Danish, not to speak of other European or global pension institutions might be very disputable.

Nonetheless, it should be recognized that the answers of the experts consulted exhibit an evident pattern indicating that the insights and resulting conclusions about investment behaviour could be common to several Danish institutions. Moreover it should be noted that the comparability of findings concerning pension institutions is generally very difficult if not impossible due to the character of the industry. Across different countries, variations in pension systems, regulations and legislation can result in very different objectives, operational procedures and also investment criteria. Even under the same jurisdiction, the uniqueness of pension plan contracts and therein included specification as well as the individual style and culture of pension institutions could substantially alter investment preferences, thus the attitude towards Art. Hence, not only the research design of the given study but also the very nature and complexity of the pension industry might result in limited external validity.

1.6.3 Reliability

Reliability addresses the possibility to repeat a measurement or investigation under the same conditions and obtain consistently the same results.

In the given research, the reliability should be considered as relatively strong. Assuming that in the case of repetition the investigations would have to be conducted under the same conditions -

[11] Garson (2008)

implying in this case that, for instance, pension plan nature and regulatory framework are regarded as the main determinants of portfolio choices - other researchers should come to the same conclusions. Of course, the presented findings reflect the subjective reasoning of the authors, however, this reasoning is consistently based on facts and deduced from the situation presented in different sources of recognized literature as well as statements of experts. Though, as was stated before, other studies on the same research question might assign a different importance to the factors considered here or take completely different aspects into account, therefore, possibly derive at a different judgement concerning the attractiveness of Art. Nevertheless, that is an issue pertaining more to the field of internal validity and should not compromise the reliability.

Note:

It is assumed that the reader commands over **knowledge of basic economic and financial concepts** as supply and demand or the essentials of portfolio theory.

2. THE ART MARKET

2.1 Introduction

The art market differs significantly from most other financial markets both with regard to participants and dynamics. In order to grasp these distinctions, the following sections will attempt to disclose these special characteristics and their implications for institutional investment, and subsequently give an initial estimate of the attractiveness of investing in the Art market.

2.2 The Art Market

The Art market has evolved continuously over centuries in order to reach its current state at which point information technologies, financial tools and nevertheless the globalization have the potential to alter its future path.

2.2.1 Historical Development

The concept of investing in Art both for aesthetic and financial reasons is not a new phenomenon. History shows that wealthy individuals chose to store their wealth in Art under turbulent times as an internationally portable and classier version of gold-bars, which were considered to be resistant to inflation and currency fluctuations. And if this wealth storage while hanging on the wall actually leads to profit - so much the better[12].

Trading in paintings appeared for the first time to a larger extent in the 15th century in the regions of Florence and Bruges. These transactions by the first existing Art dealers were mostly conducted on **primary markets** where Art pieces were sold for the first time[13].

The **secondary markets** on which Art was resold appeared around a century later with the first auction houses opening in Amsterdam and later in London and Paris[14]. The scope of the secondary market further expanded in the 17th and 18th century when the Dutch made a decent profit by buying and selling Art. The span of the Art market shortly thereafter reached the US and reached a more global scope[15].

In the 20th century, Art has become relatively more profitable, as could be illustrated by different price, however, not because of increasing rate of returns but because the return on the long term credits failed to keep up with the inflation in the 1970's. This increased investment attractiveness

[12] Stevenson (1990), p.7
[13] Ginsburgh, & Throsby (2006), p. 72-73
[14] Ginsburgh, & Throsby (2006), p. 72-73
[15] Stevenson (1990), p.7-9

contributed to the establishment of investment funds in the 1970's in New York, London and Paris. Following from this trend, one of the largest purely financial Art investments took place in 1974, as the British Rail Pension Fund invested USD360 million in Art[16].

In the 1980's the commercial banks responded to this expansion of the Art markets by establishing special Art banking units that offered advisory services to wealthy private investors and loans with Art as collateral[17]. This was accompanied with the largest boom in the market created by the Japanese paying record prices for post-Impressionist paintings. Ryoei Saito, then chairman of Fuji, set a world record by paying USD82.5 million for a single painting – 'Portrait of Dr. Gachet' by Vincent van Gogh in the late 1990's before the Tokyo property and stock markets collapsed and the first Art market bubble burst[18].

2.2.2. Current State

The Art market has not been this active since the 1990's before the burst of the bubble. Currently the Art market has reached a size of USD5 trillion and is expected to continue the current growth pattern[19]. This unprecedented market size is a result of a record increase of the total value of Art market sales, which grew by 95% from USD1.2 trillion in 2002 to USD1.5 trillion in 2006 corresponding to a revenue USD240.4 billion[20]. During the same period the number of transactions also grew from 25.5 million to 32.1 million, resulting in an increase of 24%[21].

Taking the significant increase in both Art prices and activity into consideration, experts argue that the Art market is in a better position than it was in the late 1980s. The difference this time round is that there is a greater assortment of buyers and thereby a greater spread of the risk.

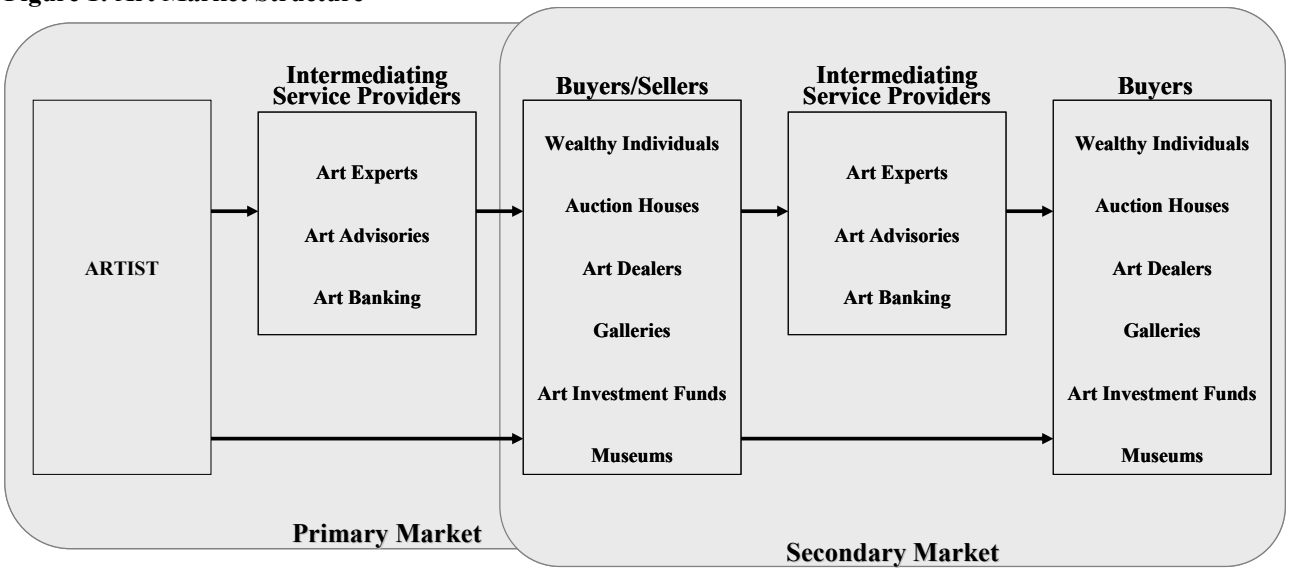
One explanation of the increase in Art prices is the global increase of liquidity and wealth creation that is driving up asset prices in various financial areas and markets. Furthermore, the level of Art prices reflects the increasing number of wealthy investors from all parts of the world. Russian and Chinese millionaires, along with the financial market players have taken up art as an opportunity to display their wealth and status. Will this trend continue - that is the question of interest for the future growth of the Art market.

[16] Stevenson (1990), p.7-9
[17] Stevenson (1990), p.7-9
[18] Gopinath (2006)
[19] Gopinath (2006)
[20] ArtPrice (2006), p.4
[21] TEFAF (2008)

2.2.3 Art Market Structure and Participants

The Art market can be divided into a primary and secondary market[22] as illustrated graphically by Figure 1. The primary market represents the initial sale of Art, whereas the secondary market conveys all the additional resale of the Art pieces.

Figure 1: Art Market Structure



Source: Own creation.

On the **primary market**, all Art pieces are directly exchanged between the artist and any possible interested buyers, thus the artist represents the starting point of all transactions[23]. There are usually four potential groups of buyers in the primary market: rich patrons; Art dealers who might be acting on behalf of a private buyer; galleries; auction houses. The price for the first sale normally reflects the supply-demand equilibrium, as the case in any other market. The trading goods can either be work from new artists or new work from established artists. Because of the nature of the good, this market is subject to imperfect information and transaction costs combined with a higher risk associated with the limited recognition of the Art[24]. The higher risk associated with the primary market, is manly driven by the lack of a historical price track record, which creates valuation issues and the need of specific expertise.

The **secondary market** provides the platform for the resale of artworks that the previous owner might desire for a variety of reasons. The composition and type of players is generally very similar to that of the primary market, however, also many service providers can additionally be found who mediate between buyers and sellers and advise the different parties. These interlinking service

[22] Throsby (1994), p.4
[23] Ginsburgh, & Throsby (2006), p.11
[24] Heilbrun & Gray (2001), p.170-171

providers, such as Art experts, Art advisories and Art banking units, increase the available information on the market which results in a significant reduction of the risk, especially when purchasing the most well-known Art pieces[25]. Significant transaction costs are connected with these transactions, as the mediating parties require fees of the range of 10-30% of the price for their services, which in most cases are a necessity in order to conduct the transaction.
Furthermore, with over a hundred magazines reporting on Art and educating the public opinion, information on the secondary market is easily gathered and opinions are being synchronized[26].

However, the implication of the current market structure for institutional investors' investment in Art is the supplementary option of investing in Art indirectly by investing in Art investment funds. Previously, the institutional investors could only invest directly in Art, most likely with significant advisory from different expert. This would imply a high level of transaction cost. Indirect investments spare the institutional investors from needing the same level of expertise simultaneously with a promised income stream. These implications will be elaborated on in the fifth part.
The Art market structure and its participants are illustrated in the following figure in order to give an overview of the service and good flow occurring in the market.

The elaborated structure of the Art market has been stable for several decades and thereby a clear division between the primary and secondary market has dominated the flow of Art. This has preserved the power division among the participants and supported the high transaction costs. However, during the past months the well-known artist Damien Hirst has initiated a change in the traditional flow, by bypassing his Art dealer and directly selling his Art at the auction houses[27]. This has resulted in an expansion of the primary market and most likely will initiate a weakening of the boundaries between the primary and secondary market. The implications of this for the general investor could be a reduction in the transaction cost base, as the number of links will be reduced.

2.2.4 Geographical Segmentation

The Art market cannot only be separated into primary and secondary market-places, but also be segmented according to the activities at different geographical locations. Generally, the previously described structure represents a standard frame which can be found in most geographical regions, though to a different extent depending on the maturity of respective regional markets. Due to the

[25] Heilbrun & Gray (2001), p.171
[26] Heilbrun & Gray (2001), p.172
[27] Lykkeberg (2008), p. 18

increased globalization and wealth, however, the division among the different geographical markets has changed. The most significant changes concern where Art is 'made' and 'consumed'.

The geographical division between the major Art markets has been determined based on the auction revenues generated from the major Art markets. In 2007 the usual top markets changed, as China took over France's place as number 3 with 7.3%.

The traditional market leaders were as previously New York City with 43% and London with 30%. This shift from the mature markets towards the emerging markets is expected to continue in the future, as economic prosperity has a spill-over effect on the Art markets[28]. This is as well illustrated by the fact that 15 out of the 35 seven-digit artists are from China[29].

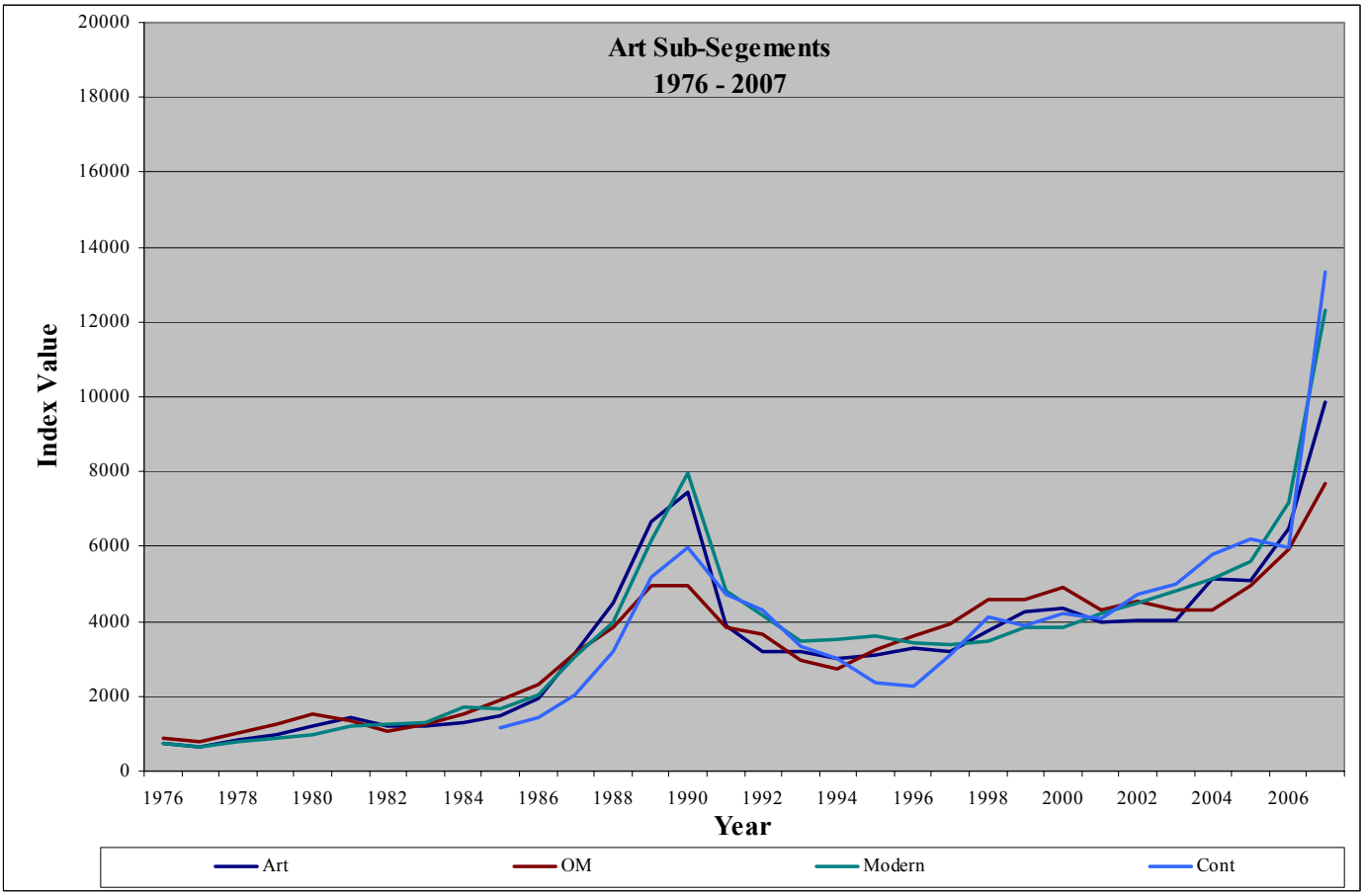
These developments of the Art market have an implication for potential investors, as the demand and supply base is increasing both in scope and size. By increasing the scope the selection of Art becomes more complex, which most likely will increase the costs connected to the investment selection. On the other hand, a broader geographical scope reduces the occurrence of bubbles that can erode the whole market under for example a financial crisis.

2.2.5 Segmentation by type of Art

Since Art is a very broad term covering different types, schools, movements and periods, the market for paintings can also be divided according to those criteria. Differences in style and type can have important implications for the risk and return of various sectors[30] which is well illustrated by the development depicted in Figure 2. Therefore, the following discussion shall elaborate on the differences between segments, emphasising in particular the implications for investment purposes.

[28] ArtPrice (2006), p.11
[29] Hollinger (2008), p. 3
[30] Campbell (2004), p. 69-70

Figure 2: Performance of Various Fine Art Market Segments (1976-2007)



Source: Own creation
(based on AMR® end-of year price data from Dec 1976 - Dec 2007; for Cont from Dec 1985 - Dec 2007).

2.2.5.1 Old Masters

The Old Master segment spans nearly 500 years and across countries and genres. As a result of their historically proven track-record, they are regarded as blue-chipped and the opinion among experts is that they are less likely to depreciate over time, compared to the other Art segments[31].

This segment is also the less volatile of all the segments, as its long historical performance results in a lower susceptibility for bubbles. The demand scope is also of a greater size, as these are considered as classics.

On the other hand, the stability of this sector reduces the opportunity for an active management strategy, in the same way as possible for the contemporary and modern art segment. The impression and importance of the art pieces belonging this category is already established and thereby rather difficult to alter.

[31] Rohleder (2008)

2.2.5.2 Modern Art

Modern art has similar fluctuations to the contemporary art. It is of a lower historical track record as it has not been on the market as long as the Old Masters. The American modernists are valued as durable American icons and have during the last decade experienced the most robust price growth. This appreciation of the art price of this category is mainly caused by active management by the mist significant art dealers[32]. This development illustrates the opportunity for active investment management which will be elaborated on in Section 4.

2.2.5.3 Contemporary Art

The contemporary Art segment has experienced the highest growth of all the Art segments over the last five years, with the US market having the largest share of the segment[33]. This expansion has additionally been aided by new online information services (e.g. ArtPrice) and by online auctions as e-Bay and Lauritz[34].

In this segment collectors are willing to take a higher risk and in the same time have the possibility to establish a collection without a substantive investment. The high risk and also opportunity for a high reward stems from the element of fashion driving this segment[35]. Thus, a relatively more careful selection is required in order to diminish or/and offset the higher risk. Art investment experts and Art collectors acknowledge the "depth, breadth and sustainable secular growth in the contemporary market"[36] and it is being depicted in ArtNews' survey of the 200 most active collectors globally where 78 % collect contemporary Art[37].

2.2.5.4 Indian Canvas

The market for Indian art is a new segment, representing the increasing involvement of the developing countries. This is not only the case in regards to demand, but also in regard to supply of Art.

The market is valued at USD25 billion. Market observers say prices for Indian Art have tripled across the board. At a Christie's auction in London in September 2005, Tyeb Mehta's *Mahisasura* - an acrylic on canvas - went under the hammer for USD1.6 million. Since then, at least half-dozen works by contemporary Indian artists were sold for USD1 million-plus[38].

[32] Weil (2008), see Appendix I for interview details
[33] TEFAF (2008)
[34] Ginsburgh (2006), p. 113
[35] Kavanagh (2008)
[36] Private Equity International (2008), p.27
[37] www.artnews.com
[38] Shah (2007)

2.2.6 Art Market Characteristics

The Art market differs from most other market as a consequence of the peculiarities of Art as a good. The most significant market characteristics are the following,

- Information inefficiency
- Information asymmetry
- High transaction costs

The above mentioned characteristics are not exhaustive and summarising all the features of the Art market. However these are the most dominant and important in regard to investing in that specific market, and will be elaborated on in order to comprehend their implications.

The quality and amount of the available information differs greatly, as Art pieces are unique and therefore relatively less fungible. The market is furthermore not fully aware of all the existing Art works, their location and condition. This is additionally supported by the lack of a common valuation method. The sum of these factors and various others result in the significant level of **information inefficiency**[39].

In addition to the inefficiencies of information, a high degree of **information asymmetry** exists at the art market. The uniqueness and related difficulties to value Art pieces contribute to the asymmetry of information among the different participants[40]. The seller has significantly more knowledge about the good, and in order to gain the necessary level of information, an unprofessional buyer would have to seek expert advice from an Art advisor or Art dealer, and thereby their position changes to an insider role[41]. This need for information is a clear indicator of the lack of symmetric information and has additional implications on a possible investment process.

The described issues of information availability and quality combined with the high margins requested by each participant of the Art market lead to the already **high transaction costs**. The high transaction costs has similarities with real estate investments which also suffer from a relatively lower liquidity as it puts pressure on the profitability level and amount of sales conducted.

The higher transaction costs and uncertainty ultimately result in fewer transactions and thereby a decrease in the liquidity of the market, impeding further the flow of information and increase transaction costs. These interrelations among the characteristics and consequences of these reinforce the **market imperfection** and complexity.

[39] Wilke (1999), p. 11
[40] Spremann (1996), p. 111
[41] Bonus & Ronte (1995), p.3

The character of Art contributes to an unnaturally high price control on behalf of the selling side, which resembles monopolistic conditions. This is evident in the status of the two major auction houses Sotheby's and Christie's, that despite having just 9.15% of the total number of auctions, they handled 76% of the global fine Art market turnover. This additionally strengthened by an average price of lots sold at USD91,805 compared to the average of USD7,156 for all auctioned lots[42]. On the demand side the consumers are unorganized, which contributes as well to the establishment of **market failure**[43].

Additionally, the relatively high transaction costs, low liquidity and lack of an adequate level of information also increase the market inefficiency. Frey acknowledges as well the impact of innovation, as imperfections can be created when the demand does not adjust to the innovative Art occurring in the supply[44].

However, it is worth noticing that the increased level of activity of the auctions houses benefit to the amount of available information and have historically reduced some of the market imperfections[45]. Additionally, the modern information technologies have improved the information level, and allowed the broader public to follow the development of the art markets. However, it is important to mind the biases existing from these information channels, as they mainly are used for marketing and promotion purposes.

The implications of such market imperfections which are reflected in the increasing returns of and monopolistic tendencies among suppliers one should theoretically be able to earn excess returns. This should not be possible based on commonly known information on an efficient market, and thereby a market failure can be concluded[46]. However, the challenge for the Art investor arises from pursuing the possible excess while avoiding the pitfalls that are so closely connected with this invest segment. The idea is that because the **art market "is highly inefficient, there is substantial opportunity to outperform through active management of a portfolio of art**," says Bruce Taub, chairman of Fernwood. "Over the long term, the financial trend is that art goes up with the economy"[47].

2.3 Art as a Good

Analysing its different characteristic features it becomes apparent that Art cannot be categorised as one specific type of good but rather shows similarities to different goods classes with respective

[42] ArtPrice (2006), p.12-13
[43] Frey (1989b), p.112
[44] Frey (1989b), p.112
[45] Stevenson (1990), p.7
[46] Pesando (1993), p.1086
[47] Opdyke (2004)

'behavioural patterns'. For example, paintings are perceived as extraordinary because they are simultaneously durable as well as financial goods.
Elaborating on those similarities shall help understand certain dynamics and drivers of Art which in turn might be of critical importance for the investment in paintings.

2.3.2. Commodity Good

Even when taking the uniqueness of Art into consideration, Art does posses some commodity good characteristics. An asset can be regarded as a commodity if it meets consumer needs or provides enjoyment Paintings provide usually no income stream but their value is merely determined by the utility or consumption value they provide to their owners. Therefore a passive investor will be in disadvantage[48]. In contrast to financial instruments like Equities or Bonds which yield dividend or interest on the basis of which their value can be estimated, paintings have no income and thereby intrinsic value as a reference point. Prices are solely determined by the market as a whole, namely the effect of demand and supply and the equilibrium between them - which is the case for commodity goods[49]. In contrast to traditional commodities, however, paintings are not of uniform quality but highly unique and experience accordingly also significant price differentiation. Even if paintings were considered to possess comparable features and be of equivalent quality - for instance, because they are from the same artist, of similar size, condition, texture or similar - their actual market value might significantly deviate.
The implication of the lack of an intrinsic value or a minimum price is an extreme susceptibility and sensitivity of prices to change according to fluctuations in supply and demand.

2.3.3 Positional Good

Art is what economists also denote a 'positional good': worth something because it is limited in supply and many people desire owning it. It is not only the absolute consumption, i.e. the welfare or pleasure that an owner derives from looking at his Art piece that influences his well-being. What is more, utility and therefore the value assigned to paintings is also (if not exclusively) a function of Art pieces' ranking in desirability in comparison to other substitutes and the prestige that the ownership confers. Especially expensive paintings are status symbols which demonstrate the wealth their owners and most importantly the ability of to afford something their peers cannot. Therefore it is also often referred to as a 'bragging good'.

[48] Scott (1994), p.66
[49] Forbes (2004)

As discussed above, Art as a good has many different characteristics that entail it to be in different good-classes at the same time. This has an implication for the investment opportunities, as it implies significant susceptibilities, which impact the liquidity on the market and introduce additional uncertainty. Future price determination also is influenced by the increased unpredictability.

2.4 Art Price Determinants

The most influential building blocks for the price of Art consist of supply, demand and the specific Art valuation aspects. As these determinants are valid for the current price, they can also illustrate potential future price movements.

When investing in Art, or for that sake in any other asset, it is important to analyze the drivers of the price in order to anticipate movements and ultimately invest or exit according to this. Hence, the following subsections will analyze the drivers of the Art prices. The impact of Art valuation and Art indices will be further elaborated in section 2.4.1.

2.4.1 Supply

The supply of Art is an interesting phenomenon, as there are particularly divided views on the motives for creating Art. The majority of the artists claim that they create and thereby supply the market merely because of their desire to express themselves. Whilst there are also a significant amount of artist that are just interested in supplying the market in order to gain financially from the existing demand. Dalí is believed to have expressed his motives as purely financial in the controversial statement - "all that interests me is money". Therefore the supply of Art needs to be analyzed according to the motives and production capacity of the artist.

The first distinction needs to be made between deceased artists and living artists, as a continuous supply from the first is non-existing. Whereas Art creation or supply from the currently active artists can be regarded as either commissioned by the buyer or speculative, where there is no guarantee for a subsequent sale[50]. This is thereby leading back to the motivation factor of the artist.

Schneider and Pommerehne view the supply in the primary market to be contingent on the production costs and the expected selling price[51]. This implies that a higher production cost or a low expected sales price can have a reducing effect on the supply side.

[50] Heilbrun & Gray (2001), p. 174
[51] Heilbrun & Gray (2001), p. 175

In the secondary market there are various supply sources as, for example, museums, Art dealers or wealthy individuals. Here the supply is contingent on the total produced and sold Art. The supply motives in this resale market are determined by taste, necessity of liquidity or expected sales price. This implies that Art owners will only sell when they do not enjoy their investment or are interested in a financial benefit. An interesting feature of the museums is though that they exhibit just one quarter of their total stock. This has an interesting implication on the price, as this impacts the level of scarcity in an artificial way[52]. This is further supported by the opinion of the supply of Art among Art dealers currently has been that "getting good Art is harder then selling it"[53]. This scarcity is also reflected in the lower transaction fees at the auction houses[54].

The supply in the Art market resembles greatly the supply in the diamond/gemstone market, where oversupply is not a desired state as that may depress the price. This supply-level is secured by a conscious decision of supplying the market sparingly, and thereby keep the prices artificially high[55].

2.4.2 Demand

The demand side for Art includes a number of participants, such as Art galleries, museums, corporate collections, Art dealers, and private Art collectors etc, who do differ in size, awareness, taste and motive. However, there are five overall determinants of the level of demand[56] which could consequently be also regarded as drivers of or brakes to Art prices.

2.4.2.1 Wealth

Wealth is regarded by most researchers and practitioners to be the most influential determent of the demand for Art, as it is the minimum requirement for purchasing Art.

Goetzmann conducted a return index on Art sold for the second time over the period 1715-1986 in order to compare the Art price movements with the stock market fluctuations. The author reaches the conclusion that there is a clear correlation between the Art index and the London Stock Exchange index. This can be regarded as evidence that the demand for Art is positively correlated with the wealth of Art collectors and thereby proves the income effect driving this market.

[52] Frey (1989b), p. 118
[53] Esterow (2008)
[54] Haugard (2008), see Appendix I for interview details
[55] Heilbrun & Gray (2001), p. 175
[56] Heilbrun & Gray (2001), p. 177-182

2.4.2.2 Expected Return

A high expected return on Art is the main driver of demand when it is seen from an investment perspective[57]. The increase in demand of Art is therefore caused by the anticipation of a future gain. The expected return can either be determined based on active investment management or from the state of the Art market, illustrated by the Art indices.

2.4.2.3 Risk

As Art is rather difficult to valuate accurately and foresee future developments, the level of risk associated with owning Art is one of the main concerns of the Art investors. Additionally, as Art is not a necessity good, the investors will regard risk as a relatively undesired characteristic. This will naturally result in a decrease of the demand, as the risk factor increases.

2.4.2.4 Liquidity

Furthermore, besides the risk associated with owning Art, the investment also implies a greater impact in the investor's liquidity level. As mentioned earlier, the Art market is not as liquid as most other markets. This will result in a decrease of the demand, as the investor's liquidity need increases. Investors will be reluctant to invest in more liquid markets, in order to maintain the opportunity to cash-out when needed, and thereby the demand of Art will decrease.
However, the introduction of lending against Art as collateral could reduce the impact of the low liquidity on the demand of Art.

2.4.2.5 Taste and Preferences

Lastly, the demand of Art can to a certain degree be acknowledged to the changes in isms and the current vogue for Art[58]. When the Art market makers change the focus on a "new" type of Art the demand most likely follows and thereby can change in a rather fast and also unpredictable direction. This shift can both occur during an intended market change and also when the individual investor simply changes their preferences for Art. The difference between these two categories of demand shift is that the first is relatively more controllable as it concerns a greater segment of the market, where as an individual taste change might not have such a significant influence on the demand.

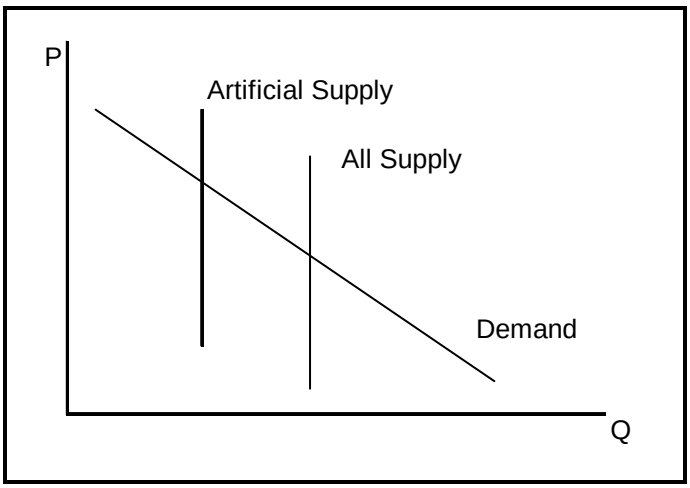
Lastly, the increase in data about the Art market and Art market participants is a clear indicator of the increase in demand[59]. This has in the same time a reinforcing effect, as the available information will further increase the demand for Art.

[57] Weil (2008), see Appendix I for interview details
[58] Campbell (2004), p. 4
[59] Campbell (2004), p. 8

2.4.3 Supply-Demand Equilibrium

The above mentioned factors determine the equilibrium between supply and demand, and are illustrated in the following graph,

Figure 3: The Supply-Demand Equilibrium



Source: Own creation.

As Figure 3 illustrates, the equilibrium differs according to the type of supply. The artificial supply imposed by the Art dealers and other Art suppliers results in a higher price for the Art on the market. This differs from the natural equilibrium where the total supply is taken into account.
Baumol however, believes that because of the unique character of art, there can not be established an overall equilibrium. There will only be an Art piece specific equilibrium[60]. The lack of an overall equilibrium makes it more difficult to determine the market price for Art in general and yields for an individual evaluation approach, which supports the complexity of investing in Art.

2.5 Return Characteristics

In the previous sections the nature of Art as a good and the characteristics of the market have been elaborated. However, for investment purposes, it is central to investigate the linkage of these to the return on the investment.
The return or profit an Art investment is the result of two factors which shall be investigated in the following: the capital appreciation that paintings experience over the holding period and which represents usually the only source of revenue; the costs associated with the investment in Art. Furthermore, various studies conducted on the particular topic of Art price appreciation and return on Art investment will be reviewed.

[60] Baumol (1986), p.12

2.5.1 Price Appreciation

To determine the capital or price appreciation of a painting it is inevitable to be able to determine value of the Art works concerned. The value of Art can either be established directly by conducting a sale, or indirectly by reference to other sales or through one of the various valuation methods[61]. The valuation of Art is also a quantitative indicator of what actually is considered to be Art[62].
When it comes to pricing Art, the experts are divided into two camps – the one that believe there exist a relative logical way of pricing the priceless and the other that believes that "there is only one indicator for telling the value of paintings, and that is the salesroom"[63]. The later believes that the market is the decision mechanism that determines the type, amount of Art supplied and the corresponding price when it comes to the contemporary Art. This is however not the case with the Art created by dead artists, as the supply is limited by their lifetime.

In order to value Art prior to an investment and anticipate price changes, we will put emphasis on the opportunity to value Art from a rational valuation model. Even though that Art is difficult to value, the professionals do attempt to reach a valid valuation based on some value determinants. There is not a common standard weight-division for the value determinants and is therefore rather individually determined amongst the Art appraisers and other experts[64].

The method most often applied to determine the intrinsic value of an Art piece is to look at the **hedonic characteristics** of the painting. These are represented by the following,

- Authenticity
- Physical condition
- Technical quality(compared to all the works of the artist and the peer group)
- Size of the painting

Besides these hedonic and rather visible qualities, the strategic impact and financial performance also can be incorporated in the overall valuation. These aspects are,

- Collection relevance
- Scarcity (as this can signal excellence)
- Reputable vendor
- Exposure level of the Art piece
- Track-record of sales prices
- Sales price of similar works

[61] Ginsburgh (2006), p. 911
[62] Frey (1989b), p. 128
[63] Stevenson (1990), p. 5-8
[64] Ginsburgh (2006), p. 198

This attempt of pricing the priceless is the most applied by the practitioners. According to the Sotheby's website, presale estimates are based on an "examination of the item" and "knowledge of the prices achieved by similar objects." This illustrates that a combination of the hedonic characteristics and a benchmarks can give the best possible information base for an evaluation. An auction house system provides merely a way to obtain approximately the current market value and can only be regarded as a benchmark

Nonetheless, there is an unarguable difference between the market value and the intrinsic value represented by the valuation of the Art experts. This gap has been proven again and again, by the unexpectedly high prices paid for certain Art pieces. One of the more extreme cases is when an Art piece from Anthony Duffways was valued for USD1.5 billion, but only reached a market value price during sale USD260 million.

The valuation issues arise mainly as art is a unique good, and thereby the valuation is based on the individual's perspective. Furthermore, the valuation is not valid over a long time horizon, as for the trends on the art market are rather unstable.

The Art market has attempted to solve the valuation issue by establishing an industry certificate. The most known is the International Fine Art Appraisers certificate. It requires a minimum of ten years experience and active participation in a knowledge sharing pool[65].

Additionally, some of the most reliable estimates of a minimum expected value are the insurance companies and the banks that use Art as collateral. They attempt to value Art in a non-opportunistic and reliable manner, in order to minimize their potential losses.

It will be of great value to develop a more general model that will provide an explanation for temporal instability and thus lead to better informed decisions. A better valuation will impact the activity level on the art market, as the information availability and quality will increase.

However, in regards to Art investments, there might be benefits of this valuation imprecision, as the benefit of having the right valuation is much higher then in a perfect market. In the words of Lord Duveen of Milbank "when you pay high price for the priceless, you are getting it cheap".

2.5.2 Art Price Indices

Art price indices are the most common tool utilized to determine the development of the Art values, and to evaluate the attractiveness of Art as an investment. However, there are some issues with this measure that increase the uncertainty of the validity.

[65] International Fine Art Appraisers (2008)

- Art is **not a standard item** and therefore not comparable
- **Survivorship bias**, as the price development is calculated based on the Art that has survived and is still possible to liquidity
- There are **changes in what is considered Art** and what is popular
- **Fraud**
- **Higher transaction costs** then on bonds and stocks

Taken these uncertainty drivers, there exist **four primary methodologies** that are applied to construct Art price indices[66]:

- Repeat-sales regression (RSG)
- Hedonic regression
- Average prices

Although being different, these methods are found to be closely correlated over a long time horizon[67]. Nevertheless, **RSG** is positively biased, as it only records the occurrence of a sale[68]. Most sales will be conducted when a positive outcome is expected, which will result in a cut-off of the lower part of the distribution. Also Goetzmann acknowledges that there might be a bias on the return on investment value, as the Art works most likely are being sold after an increase in price, which then bias the return upwards[69]. Therefore it can be argued that the price index merely ought to be regarded as approximate and rather an upper bond on the average.

Furthermore, RSG does not take the differences in quality of the painting into account, which is the main strength of the hedonic regression. The **hedonic index** on the other hand is merely limited to the observable characteristics of Art and attempts to explain the variability according to some fixed variables. Various disadvantages are to be seen in this method, as the characteristics do not vary systematically over time[70].

The differences amongst the indices and the heterogeneity of Art as a good impose the need for various indices in order to capture the peculiarities. Needless to say, the main reason for the need of a well-constructed Art market index is the need of a general market trend outline and a compartment base.

As recognized, there are various weaknesses in the Art price indices, which will reduce their usability. Although various well-established, traditional investment indices have suffered the same

[66] Campbell (2008), p. 65
[67] Ginsburgh (2006), p. 678
[68] Campbell (2008), p. 68
[69] Goetzman (1993), p. 1374
[70] Ginsburgh (2006), p. 915

inaccuracy, this can only imply that a refinement over time is not only necessary but also acceptable[71].

2.5.3 Costs

Investing in Art is connected with high costs relative to most other investment opportunities. They represent a substantial jeopardy to the profitability of Art investments and need therefore to be very thoroughly considered.

The costs that occur in relation with the investment can be classified in the following categories,

- Investment selection consultancy fee
- Authentication fee
- Purchasing and selling fee
- Insurance fee
- Storage fee
- Transportation fee
- Investment management consultancy fee
- Monitoring fee

The above mentioned costs represent the most common expenses Art investors have to incur. However, variations in the level of skills and capabilities of different investors might influence the amount of consultancy necessary[72].

However, it is not possible to create a general cost structure for Art investments, as it differs greatly for the different paintings. The only more comprehensive cost structure is the fees set by the auction houses, even though that the sellers premium is negotiable, and falls as the number of items for sale increases. However, in general the price level for purchasing Art is 20-30% opposed to selling Art, where it is to be found in the interval between 10-20 %[73].

Even though most of the cost drivers are unknown in advance of the investment, the impact of the various costs is undeniable. With so high fees connected to the purchase and sale process, the cost level is to be unarguably high. Since the rate of return is so significantly impacted by the level of cost, Section 4 will identify ways of reducing the cost of investing in Art and evaluate their potential impact on the profitability of investing in Art.

[71] Campbell (2008), p. 69
[72] Weil (2008), see Appendix I for interview details
[73] Haugard (2008), see Appendix I for interview details

2.6 Risk Characteristics

Art investments are exposed to more types of risk then most other investment types as a consequence of their peculiarities. The market inefficiency and investor irrationality increases further the risk exposure and makes risk an important consideration prior to investing in Art. The following subsections will elaborate the different risk types influencing the Art market and their implications on the return of Art investments.

2.6.1 Systematic Risk

The systematic risk affecting the Art investments cannot be diversified away as it stems from the overall market movements. However, the sensitivity towards these market movements differs among the different investment opportunities. The Old Master segment is less sensitive to these movements, and thereby less affected by the systematic risk.

2.6.2. Volatility Risk

As a consequence of the uniqueness of Art pieces, the risk of price fluctuations imposes a significant risk. A negative consequence of the high volatility levels on the Art market is the increase of speculation[74]. Experts argue that this speculation has been the main force behind the current unprecedented Art prices and might result in a bubble resembling the one in the 1990.
However, the volatility risk does differ among the different Art segment and Art price levels, which allows the investors to invest in the desired risk tier. The factors influencing the level of volatility are the base of the market and the proven track record of the artist and thereby the Art piece.
The greater the scope of the demand base, the less volatile are the Art prices as there are more buyers, which implies a greater market activity. This is illustrated by the volatility difference between cheap and expensive paintings. ArtPrice concludes in its Art market study of 2006 that expensive Art is significantly more volatile compared to cheap Art[75].

2.6.3 Illiquidity Risk

Liquidity can be regarded as one of the main disadvantages and risk-creators for Art as an asset compared to other financial assets. Art is considered to be less liquid, not divisible and with a high

[74] Campbell (2004), p. 6
[75] ArtPrice (2006), p. 7

transaction cost compared to other assets. Furthermore, the time-delay between the decision to sell and the actual sale increase the illiquidity of Art even further[76].

Though, the relatively low liquidity characterizing Art investments, there is a possibility of increasing the liquidity by lending against the Art pieces with a transaction time of less then 30 days and at competitive bank rates[77]. Additionally, the financial liquidity can be secured for a longer time horizon, as the majority of the loans are long term - of course for a premium[78]. This is not a new concept, as the well-known Dutch painter Rembrandt used his works to secure loans. Currently, the trend has been an increase in loans against Art, where for example Sotheby's has lent USD284 million[79].

The illiquidity risk is of even higher importance today, as a consequence of the overall situation on the financial markets. This is expected to reduce further the activity on the art market as the illiquidity risk is at the levels of the Great Depression. However there are some options, which have the opportunity to reduce the illiquidity risk. These specific options will be elaborated on in connection to the active management part.

2.6.4 Susceptibility to Bubbles

Resulting from the valuation issues stems the prone to irrational exuberance and art bubbles. This irrational behaviour of the market participants represents both an opportunity and a threat and highlights the critical importance of right timing of purchase. The investors will only profit, if they manage to cash in at the peak of the bubble. However, in the case of bubbles, the standard valuation tools and rationality assumptions are no longer valid. This represents a threat to the unknowing investor, as an appropriate timing for the exit might be difficult to identify.

2.6.5 Art-related Risks

Besides the market related risk types, there are various risk factors related to Art as a good. These are item-specific risks, varying according to the different Art pieces.

One of the main Art related risks is the risk of purchasing a stolen piece of art. The black market for Art has been estimated by the Federal Bureau of Investigation to be USD6 billion a year[80]. This indicates the high risk of purchasing a stolen Art piece in good faith or getting your investment stolen.

[76] Chanel (1995), p. 521
[77] Art Capital Group (2008)
[78] Emigrant Bank Fine Art Finance (2008)
[79] Farrell (2008)
[80] Madden (2008)

Art investors can draw an Art title insurance to reduce the potential cost of litigation in case of purchasing a stolen Art piece in good faith and the rightful owner wants it back. This will imply an additional cost for the investor, however, the initial investment sum will be preserved and the hassle of litigation will be avoided.

Additionally, the risk of purchasing a fake piece of art also exists. However, this can be reduced by turning to art experts and requiring certificates. This is not a guarantee, but a risk reducing action.

Furthermore, the art can accidentally be damaged. Taking into account its uniqueness and valuation issues, this represents a great threat for the investor, as the full investment or appropriate price appreciation might not be reimbursed.

2.7 Financial Performance

After the preceding paragraphs have laid the necessary foundation and provided a thorough theoretical background for understanding the different components, drivers and determinants of both return and risk, it is now in order to review the practical financial performance of paintings.

There is a growing body of literature on the Art market and paintings that investigates the performance of Art as an asset class and therefore examines different financial characteristics which are of particular importance to investors as opposed to the interest of Art lovers or collectors. So far, topics concerning the **rates of return** have traditionally received a substantial amount of attention, partly because the mere determination of prices, indices and thus returns had been an issue for a long time. An overview of the most prominent studies and their results is given in Appendix III. Considering the substantial size of transaction costs and therefore likelihood of relatively long holding periods, researchers have also investigated the performance over such longer horizons (Frey & Pommerehne, 1989; Matsumoto et al., 1994). Recently, however, also other aspects of performance have attracted notice as for example the **correlation** characteristics of Art and related prospects for **diversification** (see Flôres et al., 1999; Renneboog & Van Houtte, 2002; Ashenfelter & Graddy, 2003; Worthington & Higgs, 2004; Pesando & Shum, 2007; Campbell, 2004 & 2008) or the **cointegration** and therefore **predictability of prices** (Ginsburgh & Jeanfils, 1995; Chanel, 1995; Worthington & Higgs, 2002).

Overall, though it needs to be recognized that the researches differ often on various dimensions as, for example, the geographic areas and types of Art segments investigated, the time periods examined or the calculation and index methods employed. Therefore, results are difficult to compare and frequently deviating findings render it hard to come to meaningful conclusions about

the performance and attractiveness of Art as an asset class. In order to achieve consistency, the study at hand will conduct its own calculations and base subsequent analyses and recommendations on the therein obtained results.

2.7.1 Data Set and Methodology

In order to assess different aspects of financial performance of paintings, the analysis at hand will utilize data from Art Market Research® (AMR) which provides a variety of indices covering not only paintings in general but also different sub-segments as defined by schools, movements and periods. More specifically, for the purpose of examining the development of paintings on aggregate the Art-100-index shall be used which is a mixed basket of 100 well-known artists diversified over different types and categories of Art. Furthermore, 3 prominent sub-segments of fine Arts - the Old Masters-100-index, Contemporary Art-100-index and Modern Art-100-index - were reviewed to gain a deeper insight into possible differences within the overall asset class, both in terms of risk-return characteristics as well as strategic value. All calculations pertaining to Art indices are based on the central 80% of prices in order to exclude extreme positive or negative values as well as to improve comparability as some data was only available in this format.

To set the financial characteristics of Art into perspective, a comparison to other asset classes is in order and shall consider both traditional securities as Equities and Bonds as well as alternative vehicles as Real Estate (Property and REITs) and Hedge Funds. This selection also reflects the typical composition of institutional investors' and Danish pension institutions' portfolios (see Appendix IV). To represent those aforementioned asset classes, a set of indices has been chosen which are widely used in the financial world and generally of global nature. Please, see

Appendix V for a complete listing and more information on those indices as well as other data sources.

Overall, calculations are based on monthly data over mainly two different sub-periods, ranging from January 1990 and January 1994 to December 2007, respectively. Those sample periods have been chosen to accommodate the fact that a full data-set for bonds and real estate was only available from 1990 and for hedge funds merely from 1994. However, for the more detailed analysis and comparison of Art sub-segments also longer periods have been taken into account as figures were obtainable from 1976 (Art, OM and Modern) and 1985 (Cont). Appendix VI provides more details concerning calculations.

2.7.2 Risk and Return

The financial performance shall first be evaluated by analysing average annual returns and corresponding standard deviations as a measure of the financial risk. In that context, the figures of risk-adjusted returns shall be stressed as they are regarded as critical factors determining the relative attractiveness of different investment instruments to institutional investors and particularly pension funds. Clearly, high returns at lowest possible risks are very desirable to investors – a situation that would be indicated by a high reward-to-risk ratio of a security, i.e. a high risk-adjusted return. Furthermore, a minimum criterion for a security to be included in an institutional portfolio is the provision of positive yields in real terms which signals the ability to keep up with inflation and thus to maintain at least the purchasing power of the capital invested. Moreover, it is also critical to take possible costs and expenses into account which could substantially diminish the profit ultimately realizable. Different investment instruments are subject to varying costs and it is therefore in order to make a comparison of net returns to get a true picture of their potential attractiveness. As all those aforementioned aspect could be of relevance for asset allocation decisions and the appeal of Art as an investment instrument, calculations were made in gross, net and real terms. The respective statistics for the periods 1990-2007 and 1994-2007 are reported in
Appendix VIII.

2.7.2.1 Gross Nominal Returns

Looking at the most recent return figures in nominal and gross terms over the period 1993-2007, Art provided on average an annual return of 8.44% with a standard deviation of 15.18% which results in a risk-reward ratio of 0.5561. Comparing the different sub-segments of Art, Old Masters did best and excelled with a risk-adjusted return of 0.6669 followed by Modern Art (0.6411) and then Contemporary paintings (0.4323). Although, at first sight the Contemporary category might seem most attractive given the significant annual gross return of 14.07% it is also associated with considerable volatility of 34.92% which in the end turns it into the weakest performing segment. Overall, Art clearly outperformed bond markets which yielded - though with low volatility - on average no or even negative returns over the period 1994-2007. Nonetheless, paintings on aggregate stayed behind the results delivered by the other asset classes, particularly the risk-adjusted returns of REITs and Hedge Funds which were more than double the figure of Art (1.1164 and 1.3677, respectively). It should, however, be noted that Old Masters and even Modern Art display reward-risk-ratios quite similar to that of Equities. The Figure in Appendix IX illustrates the risk-return trade-off and thereby summarizes the relative performance of the different asset classes graphically. There, the dominance of REITs and Hedge Funds, for instance, becomes very evident given their

position in the upper-left quadrant indicative of a favourable risk-return trade-off.
Important to note is that Art did significantly worse over the slightly longer period from 1990-2007 over which its risk-adjusted return dropped to a low of 0.1273. This is most likely attributable to the immediate effects of the Art market crash around 1991 which might already have been attenuated by 1994. In contrast to that, Equities and both Bond indices performed actually better, whereas the latter delivered small but at least positive returns. Property and REITs also lagged their risk-adjusted returns over 1994-2007, though their short-fall is rather insignificant compared to the substantial divergence in the performance of Art.

2.7.2.2 Gross Real Returns

Considering the impact of inflation, the average annual real return on Art over the period 1993-2007 was lower than in nominal terms and amounted to 4.69% while displaying an almost identical volatility of 15.17%%. Thus, paintings displayed in real terms only a risk-adjusted return of 0.3093 (as compared to nominal 0.5661). The Modern segment is heading the other categories by providing 0.3605 units of reward per unit of risk, followed by Old Masters (0.3449) and at last Contemporary (0.2785). Overall, according to those findings, paintings appear to fulfil the essential investment criterion of yielding positive real returns. However, the relative performance of the investment classes investigated resembles the one seen for the risk-return characteristics in gross terms: Art is again able to outperform the negative yields on bond markets but is itself outdone by the other instruments.
Strikingly, the average returns on paintings over 1990-2007 could not keep up with inflation as reflected in the negative real return of -1.25%. In this context, the Contemporary segment stands out as it delivers on average at least a marginal positive yield and a return-risk ratio of 0.0156. Also the other asset classes investigated show a weaker performance over the 16-year period but have only slightly lower average annual results than over 1993-2007 when compared to the shortfall of Art. Once more, the disappointing results of paintings might be ascribed to the strong impact of the Art market crisis in 1991 on prices which losses are not included in the shorter sample period.

2.7.2.3 Net Nominal Returns

To examine the impact of costs, the analysis focused on the charges incurred on the purchase and sale as those are most apparent or identifiable with relative certainty (see Appendix VII for assumptions about transaction costs). Incorporating such transaction costs into the calculations of annual risk-return characteristics demonstrates that those expenses significantly diminish the financial performance of Art. If seller's and buyer's premia - assumed to be 10% and 20% of

hammer prices, respectively - are subtracted paintings result on average in a loss of 18.67% or -1.6394 risk-adjusted return over the period 1993-2007. Over the two other periods 1990-2007 and 1976-2007, the performance shows to be equally weak though somewhat less pronounced with risk-adjusted returns of -1.5645 and -1.0264, respectively. Comparing different Art segments, Old Masters appear to be most negatively affected by transaction costs, followed by Modern and then Contemporary paintings. All categories have similarly negative annual returns but in this case a lower volatility as that of OM implies that returns scatter closely around that negative mean whereas the high standard deviation of Contemporary means that chances of obtaining also higher returns are better. In relation to other investment instruments, the standing of Art deteriorates clearly through transaction costs and even falls behind bonds which are also associated with negative but comparatively smaller losses.

Except for that, the relative attractiveness of the asset classes has not changed: REITs provide also in net-terms the most appealing risk-return trade-off exceeding that of Property and Equities. It is remarkable, though, that Property performs better than stocks given that the first faces substantially higher transaction costs of 10.5% versus a mere 0.5% for a round-trip.

2.7.3 Holding Period Considerations

Concluding from the previous discussion, the financial performance of Art appears to be relatively weak in comparison to other traditional and, especially, alternative investments vehicles. The average annual return provided by paintings does not sufficiently compensate for the degree of risk that needs to be assumed (as captured by the risk-adjusted return). It is therefore of interest to investigate whether this picture would change if longer holding periods were considered. Since researchers could demonstrate with regard to equities that stocks - though being rather volatile in the short-run - display a much smaller range in return values and are characterized by decreasing volatility over longer investment-horizons[81]. Following this reasoning, Matsumoto et al.[82] applied the idea to Art and examined the behaviour of annual real returns and volatility of different painting sub-categories over investment horizons ranging from 1 to 10 years. They showed that over the period of their investigation (1975-1989) the standard deviations across all segments were declining rapidly with increasing investment horizon and, consequently, the reward-to-risk ratios were found to improve for longer holding periods. In the same line, the study at hand observes the risk-return profile of Art on aggregate and selected sub-segments over varying investment horizons, ranging from 12-60, 120, 180 and 240 months (see

[81] Glassman & Hasset (2000) or Siegel (1998)
[82] Matsumoto, Andoh & Hoban (1994), p. 515

Appendix X). As suggested by Matsumoto et al. computations were performed in real terms in order to take inflation into account which might present a very decisive factor when long-term performance of investments are considered.

The results for the investigation period 1976-2007 follow the previously identified pattern: although average annual returns for all categories are steadily decreasing for longer investment horizons, the pertaining standard deviations decline at an even faster rate. Accordingly, reward-risk ratios constantly improve from a low of 0.0926-0.1619 (OM and Modern) over a 12-month horizon up to 2.6182-4.2677 over a 240-month horizon. Thus, it seems that **Art investments when held for a longer time become relatively more attractive than when considered over short-term horizons**. Though, this positive effect is somehow challenged if annual returns for holding periods based on data from 1985-2007 are considered (including the development of Contemporary Art). The results deviate from the previous observations as the risk-adjusted returns for Art, OM and Modern actually decrease continuously over the considered horizons and eventually even turn negative when held for more than 60 or 120 months, respectively. Only the Contemporary segment succeeds to maintain constantly positive risk-adjusted returns. While its reward-to-risk ratio initially decreases over holdings of 12-120 months from 0.3009 to 0.1435, it can subsequently improve its performance over the longest investment horizon to a value of 0.5589.

The positive effect of longer investment horizons on Art investments is **even more pronounced if transaction costs are taken into account**. The previously presented statistics of annual net returns illustrated the detrimental impact that buyer and seller premia - let alone other expenses - can have on the risk-return profile and therefore on the attractiveness of Art. Whereas annual net returns are significantly negative in a range from around -19% to -24% for a 12-month horizon, the picture improves for holdings over longer timer-horizons. In the period of 1976-2007, Modern paintings turn on average positive when held for 180 month, whereas the overall Art index and OM display positive returns for an investment horizon of 240 months. Again, this effect appears to be less defined for results over the period 1985-2007 as over the longest holding period investigated (180 months) all segments still yield negative results. Nonetheless, it has to be acknowledged that, although returns remain negative, all categories provide a comparatively better risk-return trade-off in the long-run than over the short-term.

Still, regardless of the relative improvements that paintings can achieve, overall they cannot keep up with the rewards provided by other investment instruments as Equities which are also reported in order to provide a reference point. Even if the effect of transaction costs is neglected, the gross risk-adjusted return of the best performing Modern segment stays behind the profits that an investor

could expect over the same holding period of 240 months on stocks (4.2677 versus 5.9858).

2.7.4 Role of Art in Efficient Portfolios

The previous sections presented and compared the historical performance of different asset classes in terms of return and risk. Evaluating Art on the basis of those results, one could conclude that paintings are generally dominated by alternative assets and transaction costs present a serious issue further diminishing its attractiveness. However, it is critical to assess the performance of different instruments not only on a stand-alone basis but rather in the context and as part of a portfolio. This is of particular relevance when the asset allocation decisions of institutional investors are considered: they are concerned about the best composition of their mixed-asset portfolios in order to achieve certain minimum return targets at lowest possible risks, i.e. obtain efficient allocations. The correlation between asset classes is a natural starting point to gauge the likely diversification effects and possible role in such efficient portfolios (see
Appendix XI for correlation statistics).

Based on data from 1994-2007, Art appears to be inversely related to Bonds (both, aggregate and treasury index) and REITs as indicated by the negative correlation coefficients with the respective indices. The negative association with Bonds and resulting diversification potential might be of particular value as pension institutions and especially Danish representatives are known to have a substantial part of their holdings in form of those fixed-income securities (see Appendix IV). Moreover, returns on paintings are hardly related to those of Hedge Funds and display also only a weak correlation with both, Property and Equities. Those results are indicative of the opportunity for diversification through Art, thus a reduction of a portfolios' overall systematic risk.
To investigate this issue further two risk-efficient frontiers of diversified portfolios have been constructed: one frontier including and the other excluding investments in Art. The percentage allocations to the different asset classes in the efficient portfolios are presented in
Appendix XII along with a graphical depiction of the frontiers. Those results confirm that **Art could be a very valuable addition to investors' portfolios** as it provides favourable diversification effects lowering the portfolio's volatility. The position of the efficient frontier including Art above the one without Art well illustrates that fact.
However, this conclusion must be treated with caution as the calculations from which it is deducted rely on two critical presumptions not necessarily satisfied in practice. Firstly, the efficient portfolios are derived at by utilizing the **correlation between indices** representing both Art and other asset classes. It is thereby implicitly assumed that an investor would be willing to invest in the Art-100

index or in an investment fund which holds the composition of the index. Thus, the diversification benefits demonstrated by the calculations would only accrue to the investor holding a broad assortment crossing different paintings schools, periods and Artists.

Secondly, the picture might alter if calculations were not based on gross but **on net values**, that is if transaction costs were taken into account. As it was stated before, the impact of seller and buyer premia renders the direct investment in paintings highly which would prevent financial investors to consider Art holdings in the first place. Only if held over very long horizons investors could expect positive returns so that long holding periods virtually represent the only sensible strategy for direct holdings. Assuming this, it would be necessary to investigate **correlation structures and efficient portfolio allocations over longer periods**, too, in order to assess the true value of Art as a diversifier. Otherwise, if indirect modes of participating in the Art market were pursued in order to reduce or even avoid certain costs, one would need to investigate further whether those possessed the same diversification benefits. For instance, if Art investment funds were contemplated on should scrutinise not only the performance but especially the correlation characteristics of Art under this form of management.

2.7.5 Conclusion concerning Financial Performance

In sum, the preceding analysis showed that Art when assessed in gross and nominal terms provides solid but overall not competitive returns to those delivered by other financial instruments. Especially more alternative vehicles as Real Estate (both in form of Property and REITs) or Hedge Funds against which paintings would most likely have to prove their value as investment vehicles did markedly better. However, as the calculations of correlation characteristics and efficient frontiers could prove, Art might compensate for this lower return by providing beneficial diversification to institutional portfolios.

Regarding the performance in real-terms, it seems that paintings can generally meet the minimum criterion for any financial investment which is the ability to keep pace with inflation so that capital is at least preserved over the time of investment. It could be demonstrated that if held over longer periods, the real return earned per unit of risk considerably improves. Though, it must be admitted that depending on the investigation period, the evidence for the former is slightly mixed.

However, the position of Art holdings worsens notably when the effects of transaction costs are taken into account and results on average into substantial losses. Even when longer investment horizons are considered, paintings appear to turn only profitable after more than 15 years (180 months). Clearly, those costs represent a very large obstacle deterring investors from considering

Art as an investment vehicle. It is essential to contemplate possible strategies and maybe alternative modes of investing by which means those expenses could be mediated and reduced to a level at which the beneficial diversification effects can unfold.

2.8 Conclusion

Based on the analysis of the **idiosyncrasies and current conditions of the Art market**, the general appeal of paintings as investment instruments was judged to be far from convincing but rather weak. At first sight, the average financial performance appears not outstanding but quite solid and Art excels through its favourable correlation characteristics yielding substantial **diversification benefits**. However, paintings stay clearly behind the returns delivered by other, especially alternative investment vehicles. What is more, although expenses for insurance, maintenance or storage otherwise incurred on the (direct) holding of paintings are not even explicitly provided for and only **transaction costs** are taken into account, the significant deductions result in actual losses. In this manner Art disqualifies from being considered by any financially motivated investor unless certain strategies or alternative investment mode provide remedy. Furthermore, the high **illiquidity** of the Art market along with serious difficulties and therefore uncertainties about the **valuation** of paintings represent sources of risk which are hard to quantify and therefore not even reflected in the results of risk-return calculations. Adding to the negative factors, the very nature of the Art market demands especially from financially motivated actors to possess **very sophisticated expert knowledge** before any investment on the Art market should be considered

3. INSTITUTIONAL INVESTORS

3.1 Introduction

In the previous section the most distinguishing characteristics of the Art market and an analysis of the performance of paintings on typical financial criteria have been presented. On the basis of those aspects, an initial assessment of the possible attractiveness of paintings as an investment vehicle has been undertaken. Furthermore, the previous considerations should have established the foundation for evaluating the possible appeal of Art investments to institutional investors and particularly pension institutions. As it had been explained before, the perspective of institutional investors is chosen because they are usually assumed to act rationally and be only led by financial reasoning in their investment decisions - rather than personal motives or tastes. Thus, an analysis from their point of view is expected to reveal best the value of Art as a financial instrument. In order to gauge such appeal to pension institutions it is first necessary to understand the overall investment approach, strategies and related criteria for portfolio choices. Afterwards, concrete conclusions about the potential role of Art in this context are to be drawn in a second step. By establishing the requirements applied to investment vehicles in the portfolio selection process it shall be further elaborated on the reasons rendering Art potentially interesting as well as the possible obstacles deterring institutions from investing.

3.2 Pension Institutions' Investment Strategy

The investment strategy of institutional investors is generally guided and significantly determined by the respective **organizational objective**. Scott (1994), for example, concludes that "whether a fiduciary should hold a particular asset class depends on his or her institution's objectives, anticipated returns, other opportunities and the costs of management"[83]. Specific return and risk targets as well as preferences regarding financial characteristics to be possessed by portfolio assets can often be directly derived from the overriding objective.

According to the OECD Insurance and Private Pensions Committee (2006), the basic organizational objective of all pension funds is to serve "as a **secure source of retirement income**"[84] for their clients. Based on this definition each institution formulates individual **retirement income objectives** which reflect the characteristics of pension liabilities and specify the degree of risk acceptable for the different parties involved (as the pension fund, plan sponsors, plan members &

[83] Scott (1994), p. 62
[84] OECD Insurance and Private Pensions Committee and Working PArty on Private Pensions (2006), p. 9

beneficiaries[85]). In line with the thereby defined objectives, an **investment strategy** is developed outlining the concrete approach to be undertaken in order to achieve the stated targets. The latter addresses subject areas as:

- **strategic asset allocation**
- **tactical asset allocation**
- **performance objectives**
- **monitoring and risk management**.

Following this illustration, it becomes evident that any factors determining the income objective and thereby the return and risk specifications of different pension institutions impact directly the criteria set out for pension portfolios and assets. Concerning those factors Davis (1993) stated that "[t]he influences on [portfolio] distributions, as well as risk and return, are shown to include the **nature of liabilities, regulation, accounting standards** and the **supply of certain financial instruments**"[86]. Also, practitioners of Danish pension institutions confirmed that two issues are of critical importance for their investment decisions:

- pension institutions' **liabilities** are substantial drivers of return targets
- **regulations** concerning solvency and stress resistance establish clear constraints for risk.

Therefore, the following discussion shall pay particular attention to examining those two factors in order to elaborate a set of investment criteria against which Art can be evaluated. Though, it needs to be recognized that the nature of pension liabilities as well as the applicability and severeness of regulations can vary for different types of pension plans and investigations shall take this into account. Thus, before discussing in detail the drivers of and ultimate investment strategies, different types of pension schemes (especially those prevalent in Denmark) shall be shortly presented.

3.3 Types of Pension Schemes

Information on different forms of pension plans, both on a global as well as Danish level, can be obtained from primary and various types of secondary sources. As **primary sources** on Danish pension programs serve, on the one hand, materials issued by pension institutions to inform existing or potential clients, on the other hand, the interviews with practitioners of the Danish pension industry (see Appendix I for a list of interviewees).

Otherwise, the OECD (2007) or World Bank (Whitehouse, 2007; Davis, 1993; van Dam & Andersen, 2008; Andersen & Skjodt, 2007; Ladekarl et al., 2007), for instance, publish studies on the subject of retirement income systems in different countries which elaborate on various aspects

[85] OECD Insurance and Private Pensions Committee and Working PArty on Private Pensions (2006), p. 6
[86] Davis (1993), p. 41

as the structure or basic principles but also present varying forms of pension plans. Moreover, a large body of materials ranging from academic studies (Dent & Sloss, 1996; Kilgour, 2006; Bodie et al. 1985) or newspaper articles (Turner, 2003; Godwin, 2000; Zall, 2002) to publications of employer and employee associations is available which focuses directly on the discussion of different types of pension schemes. Those sources often compare the most salient features of the different pension programs, explain respective dis- and advantages or address issues as the varying distribution of risks and responsibilities among pension institutions, sponsors and beneficiaries.

3.3.1 General Types of Pension Schemes

Globally, one usually distinguishes between three basic types of pension plans:

- **defined-benefit plans (DB)**
- **defined-contribution plans (DC)**
- defined-cash or **cash-balance plans (CB)**

Those three schemes differ mainly with regard to the way in which benefits and contributions are determined. Most importantly, DB and CB plans **guarantee** beneficiaries a certain **pension benefit**, either in form of an absolute amount (DB) or minimum return promised (CB). Such contractual promises result into liabilities for the respective plan sponsor or the pension institution directly. On the other hand, DC plans merely **specify the amount to be deposited** to the pension accounts, therefore, imply no obligation to pension institutions. Figure 4 reviews and compares the most distinctive characteristics of each pension plan. Those features form collectively a complex construct of factors and interact to determine target for returns, the exposure to as well as the distribution of risks among different parties. Therefore, pension institutions might opt for very different asset allocations and measures of risk management in order to best accommodate the risk-return profile implied by the specific type of pension scheme.

Figure 4: Overview of different pension scheme types

	Defined-Benefit	Defined-Contribution	Cash-Balance
Definition of Benefits	• **guarantee of fixed pension benefit** in form of **absolute amount** to plan participants (life-long) • determined via formula (based on final salary, career-average salary, fixed-cash amount per year of service) • exact amount determined upon commencement of retirement ⇨ plan sponsor or **pension institution bears investment risk**	• no guarantee of certain pension benefit to plan participants • determined by capital accumulated over active life through contributions and investment return achieved ⇨ **plan beneficiary bears investment risk**	• **guarantee of pension benefit** in form of promised **growth rate** • determined via formula based on percentage of salary and stated growth rate (usually related to an index) • possibly varying over time with changes in reference index of guaranteed return ⇨ plan sponsor or **pension institution bears investment risk**
Definition of Contributions	• no specification of periodical contribution • determined actuarially and varying in response to funding ratio • affected by changes in portfolio value	• **fixed contribution** in form of percentage of salary or absolute periodically payable amount • determined via formula considering beneficiaries' age, service or grade • possibly varying over time with changes in variables underlying formula	• **fixed contribution** in form of percentage of salary or absolute periodically payable amount
Principles of Fund Management	• **pooling and collective investment** of contributions • investment and asset allocation decisions at **discretion of sponsor or fund administration**	• depositing of contributions on **separate, individual accounts** • ownership of assets in individual account by respective beneficiary • investment and asset allocation decisions at **discretion of plan participant**	• **pooling and collective investment** of contributions • investment decision at **discretion of sponsor or fund administration** • tracking of current balance of contributions and investment returns in **hypothetical or fictional individual accounts**
Form of Disbursement	• typically: life-time **annuity**	• typically: **lump-sum**	• **lump-sum** or **annuity**
Indexation	cost-of-living-adjustments (COLA) or ad-hoc adjustments granted post-retirement → upon contractual terms/agreements or discretion of sponsor		
Risk-benefits	survivor, death or disability arrangements → upon contractual terms/agreements or discretion of sponsor		

Focus Area

Source: Own creation.
(based on information from Dent & Sloss, 1996; Whitehouse, 2007; Godwin, 2000; Kilgour, 2006)

3.3.2 Types of Pension Schemes in Denmark

Applying the previous framework, the majority of Danish occupational pension schemes can be classified as either **cash-balance or defined contribution plans**.

Though, studies often describe plans belonging to the 2nd pension pillar as being "largely defined

contribution plans" [87] this is a generalizing and over-simplifying characterization. On closer inspection, it becomes evident that many of the pension schemes often declared as DC plans should actually be considered as **CB plans** as they combine characteristics of both DC and DB plans: they determine and fix pension contributions payable, do however also involve contractually guaranteed minimum returns and share also other similarities with DB plans. During the 1980s and 1990s it was a common practice for pension institutions in Denmark to promise minimum nominal interest rates on new pension policies[88]. These guaranteed after-tax returns were set at a level similar to the respectively prevailing technical discount rate and gradually decreased over time from initially 4.5% to 2.5% and 1.5% (in 1982, 1994 and 1999) as market developments and the reference rate changed[89]. Overall, Danish insurance companies provided minimum guaranteed returns on 90.44% of their pension contracts, whereas 48.44% of all contracts carried an interest rate of more than 4% in 2007 (see Appendix XIII).

Only a relatively recent feature of the Danish pension industry, the so-called **unit-linked products**, fits the traditional definition and can therefore be categorized as a **DC scheme**. Unit-linked plans do not promise pension participants a certain benefit in any form and thereby present no contractual liabilities to pension institutions or plan sponsors. Though, "most of the unit-linked products used in Denmark carry some sort of protection against investment risk, usually a zero-rate guarantee" [90]. In return for this increased investment risk levied on beneficiaries, those products give customers the freedom. They can choose the investment assets, policies and fund managers matching best their respective risk-return profile – all typical qualities of DC plans. Currently, contracts with unit-linked characteristics account for only 9.56% of all life-insurance companies' charges in Denmark (2007, see Appendix XIII). However, historical figures illustrate an increasing trend which can be expected to continue (and even accelerate further) in the future as many pension institutions strive to shift their customer towards the adoption of those DC schemes, as mentioned by pension experts. This is in line with global tendencies to unburden retirement-income institutions from increasing obligations and thereby alleviate the pressure on pension systems from demographic effects.

Merely a very small portion of Danish plans, namely civil service pension schemes, follow **defined-benefit principles**. The following discussion will focus on distinguishing between the respective implications of CB and DC plans as they are the most important schemes in the 2nd pillar of the Danish pension system.

[87] Davis (1993), p. 10,
[88] Ladekarl et al. (2007), p. 3
[89] van Dam & Andersen (2008), p. 9 and Ladekarl et al. (2007), p. 8
[90] Andersen & Skjodt (2007), p. 23

3.4 The Impact of Liabilities on Asset Allocation

As stated before, there is a rich body of literature discussing pension systems as well as different types of pension plans. However, the purpose is mainly to specify implications regarding costs or the overall welfare conditions, not to comment on the impact of different plans on investment strategies. Only the Committee on the Global Financial System (2007) relates explicitly (though still very broadly) the characteristics of pension plans to variations in the investment and risk-management approaches. Therefore, in order to derive at conclusions about the influence of different types of pension plans on asset allocation and, thus, the possible role of Art the rather general information on schemes has been combined with literature on typical strategies of pension institution for portfolio and risk management. The latter sources included especially but were not limited to research on asset-liability management (Baum, 1996; Bookstaber & Gold, 1988; Keintz & Stickney, 1980) or liability-driven investing (Austin et al., 2006; Ryan & Fabozzi, 2002).
Of course, the interviews with practitioners of the Danish pension industry and the direct explanations of respective institutions' investment criteria provided very valuable insights.

3.4.1 Cash-Balance Plans: Objectives and Return-Risk Preferences

Guaranteeing a set, minimum return on pension contributions to beneficiaries over the accumulation and also payout phase[91] under Danish CB plans represents a **fixed obligation** to the pension institutions concerned. Consequently, a primary objective for the CB providers becomes to secure that those liabilities "can be met permanently"[92]. This so-called **'objective of safety'**[93] is mainly associated with achieving the **'objective of sufficient funding level'**, but can in certain instances also include the **'objective of liquidity'**[94]. The respective importance of either of those two objectives can vary across different institutional pension funds and hinges on the size or severity of liquidity requirements.

Generally, pension funds need at all times to dispose of adequate liquidity in order to be able to fulfil in the short-run the pension claims already due ('retired life liabilities') and to cover administrative costs. Overall, such liquidity needs of pension institutions are relatively moderate compared to those confronting other institutional investors as banks or life insurance companies. Liabilities of pension plans have a very long-term character because deposited funds can usually not

[91] van Dam & Andersen (2008), p. 6
[92] Baum (1996)
[93] Baum (1996), p. 579
[94] Baum (1996), p. 579ff

be withdrawn prematurely[95] and contributions follow a predictable pattern, too, so that unexpected and large requirements for cash are rather unlikely. Nevertheless, the specific requirements can vary between different pension funds as the liquidity needs are a function of **pension scheme maturity**. Pension scheme maturity is a concept which refers to the long-run ratio of contributing to benefiting members[96], whereas a high ratio indicates immaturity and vice versa maturity of pension plans. The higher the maturity, the larger is the share of liabilities deriving from obligations to already retired members which have to be satisfied on a continuous basis and thereby result in the need for cash or liquidity. In line with this reasoning, a higher maturity of pension funds will condition the prevalence of liquidity objectives, whereas a lower maturity will leave a stronger influence of funding objectives on overall investment decisions.

3.4.1.1 Objective of Sufficient Funding

Currently Danish pension institutions can generally be classified as schemes of **lower maturity**. In 2007 the inflow of contributions exceeded with USD18.6 million (DKK98 million) the amount of current liabilities of USD12.9 million (DKK68 million)[97] by approximately 40%. Thus, it appears that contributions provide at the present time sufficient buffer supplementing investment income as a source for funding of pending liquidity requirements. Consequently, pension institutions can focus on and gear the investment strategy towards the demands posed by funding or solvency objectives.
Such solvency objectives describe pension institutions' ambition to ensure - over the long-run - that the value of their assets is adequate to cover the total value of obligations towards pension beneficiaries. Importantly, the total value of obligations does not only refer to current, already payable pension obligations but includes also 'active life liabilities' commencing in the future. In Denmark, this objective is translated into requirements for **technical provisions** which are minimum capital provisions institutions have to dispose of in order to ensure that pension payments can be satisfied[98]. The size of those provisions is determined as a certain percentage of the present value of all payable obligations[99] and therefore takes into account both, the value of existing as well as future liabilities.

The size of technical provisions establishes a clear **minimum target for the value of assets** to be

[95] Note: Maturity is fixed unless pension contracts entail American type guarantees which can be exercised any time before or at maturity, a practice followed between 1982–1994 in association with contracts guaranteeing minimum returns of 4.5%, see Ladekarl et al. (2007), p. 8
[96] Davis (1993), p. 11
[97] The Danish Financial Supervisory Authority (2008), p. 2 - figures are converted to USD with the exchange rate of 5.26476 DKK/USD from 12 September 2008 (www.exchangerate.com)
[98] De Nederlandsche Bank Eurosysteem (n.d.)
[99] Note: Solvency objectives are usually expressed in form of targeted funding ratios. However, here is no mentioning of funding because Danish pension plans are commonly classified as DC schemes which by their very nature (non-existence of liabilities) are considered to be fully funded (see Andersen & Skjodt, 2007, p. 62-63).

built up. Furthermore, the growth in those provisions resulting from, for instance, increasing pension contribution rates should at least be matched by the growth in assets. That is, the **minimum investment return** should parallel the growth in provisions or otherwise solvency might be endangered over the long-run. Overall, pension portfolios should be designed in a manner creating **capital growth** since a majority of obligations arises from active lives which only become due at a future point in time. Since the value of active life liabilities is rather uncertain and volatile due to their sensitivity to changes in actuarial variables and interest rates it is crucial to hold investment instruments which **generate surpluses** able to absorb possible fluctuations in liabilities[100]. Next to the desire to accrue reserves for the funding of liabilities in years of weak performance, the ambition will be to maximize returns in order to be able to distribute bonuses to pension fund participants in line with the profit participation principle at the core of almost all Danish pension agreements[101].

The **investment risk** that pension institutions are willing to assume is like the return targets to a significant degree determined by **solvency considerations** and will be limited to a level at which the funding of liabilities is not jeopardised. Nonetheless, providers of CB schemes might actually display a moderate to relatively high tolerance for risk. This is, on the one hand, a result of the **lower pressure from liquidity** needs, on the other hand, a consequence of the possibility to **transfer or shift the investment risk** it bears **between different generations of beneficiaries**. For pension funds of lower maturity, the share of liabilities arising from current pension payments should be comparably small and predictable and, therefore, be fundable by current investment income. Moreover, in case of detrimental market conditions and associated lower than expected returns at the due date of payments, CB plans are able to draw also on the current contributions to fund current liabilities. This option provides pension institutions with certain room for manoeuvre and prevents the immediate liquidation of assets as well as associated incurrence of investment losses. Consequently, CB providers might be willing to assume higher risks and "[i]n principle, the portfolio share of liquid [thus, safer] assets can be small"[102]. Assets which are temporarily more volatile but promise the highest and in the long-run also relatively stable returns could well be included in CB portfolios. Though, the ultimate level of risk borne is naturally also contingent on the organizational culture and managerial style of the responsible persons in the pension funds.

[100] Ryan & Fabozzi (2002), p. 14
[101] van Dam & Andersen (2008), p. 8-9
[102] Davis (1993), p. 27

ART

As it was highlighted, the predictable nature of liabilities and contributions under CB plans allows pension institutions to be more tolerant towards assets of lower liquidity than other institutional investors. They can afford to include a greater share of less liquid securities in their portfolios without necessarily sacrificing their objective of security. Therefore, in principal there seem to arise **no direct obstacles** for the adoption of Art as an investment vehicle **from the perspective of liquidity**. However, even though illiquid assets can be included in the portfolio investors will generally expect a higher premium in return for the associated risk assumed. Looking at the returns of Art - which on gross terms kept barely pace with and on a net basis clearly **underperformed more liquid** asset classes as stocks (see
Appendix VIII) - paintings appear to not compensate sufficiently for their limited solvability. Considering that other investment instruments which are also relatively illiquid (e.g. Property) deliver much better returns, it seems more reasonable that pension institutions focus on those alternatives.

3.4.1.2 Objective of Liquidity

In the future, the overall **maturity** of Danish pension schemes might increase and thereby, alter the objectives, the risk-return preferences as well as the asset allocation decisions. Demographic developments as the ageing of population and/or the eventual closing of CB-plans as a consequence of a gradual shift towards unit-linked products could lead to a continuous subsiding of capital inflows and thereby a more pronounced need for liquidity. Some indications for this development can already be recognized at the present moment: although the total amount of incoming contributions exceeded the out-payments to pensioners in 2007, the inflows increased from 2006 to 2007 by only about 9% whereas outflows grew by about 12%[103]. As elaborated before, the higher the proportion of retired compared to active lives, i.e. the more mature pension schemes become, the higher will be the requirements for liquidity.

Depending on the contractual agreements regarding the terms of pension disbursement such liquidity needs might manifest themselves and be reflected in the portfolio decisions in different manners. If retirement benefits are paid out as **annuities** it will be aimed to generate **returns in form of income** (in contrast to capital appreciation) and to align the size and timing of this income with those of the liability streams. That is, pension institutions might display a preference for assets which provide constant streams of cash-inflow closely matching the term-structure of cash-outflows

[103] The Danish Financial Supervisory Authority (2008), p. 2

from current liabilities[104]. If the retirement income is disbursed as a **lump-sum** to beneficiaries, the overall liquidity of investment instruments could represent an important selection criterion for a CB fund that is closed and gradually phasing out. Since obligations present larger sums and the capital base is supposed to be successively dissolved, pension institutions would clearly prefer holding **more liquid assets**. Those can fast and easily be disposed without incurring high transaction costs or impacting market prices which could otherwise result in a reduction of sales proceeds.

Maturing pension institutions will be increasingly **averse to assume investment risk** and strive to minimize fluctuations in investment income (for annuity-based contracts) or variations in asset values (for lump-sum agreements), respectively. With a decreasing number of active pension plan participants and accordingly declining contributions, it becomes increasingly difficult or even dangerous to shift investment risk to younger generations. Clearly, "[t]he more mature the scheme, the shorter the time horizon to make up deficits"[105] and, therefore, the incurring of (unexpected) losses will be avoided by any means.

ART

With increasing importance of liquidity considerations, the **lack of regular income** on Art investments might be considered as a substantial disadvantage, particularly when being compared to fixed-income securities, blue-chip stocks or Real Estate investments. This is because the latter offer not only a recurring but also very stable stream of cash inflows that would be able to fund fixed, current liabilities once pension contributions start to slow down. Moreover, the higher the share of obligations versus contributions, the stronger will be the preference for securities with not only regular return but also assured value developments and easy disposability - all criteria speaking against holdings of Art which are suffering from **valuation difficulties and high illiquidity**.

3.4.2 Cash-Balance Plans: Investment Strategies and Risk-Management

In line with previously presented risk-return considerations, different investment strategies and risk-management techniques might be employed - each with varying implications for the appeal and suitability of Art investments.

3.4.2.1 Investment Strategy: Asset-Liability Management

In order to address especially the objective of solvency and the associated specifications of

[104] Ryan & Fabozzi (2002), p. 14
[105] van Bezooyen (2003)

technical provisions, pension institutions often engage in **asset-liability management (ALM)**. ALM entails that the portfolio of assets is designed in a way that matches the obligations both in value and sensitivity to certain risk-factors. That is, investment and asset allocation decisions are basically made with consideration of drivers and uncertainties pertaining to the present value of liabilities as the latter forms the basis for calculations of technical provisions.

The **present value of liabilities** is a function of the expected future value of those obligations as well as the discount rate employed in the course of calculations. Thereby, the future value is significantly conditioned by **actuarial assumptions** about certain characteristics and behaviours of the population of beneficiaries. In particular, estimates of factors as

- rate of salary progression
- turnover or withdrawal entry and exit dynamics
- length of career
- life expectancy or longevity (assuming annuity agreements)

can have a substantial impact on the value, timing and maturity of future benefit payments that pension institutions have to fulfil[106].

The **discount rate** should usually satisfy two important criteria: it should "reflect the timing of future payments" and "be based on current market-determined interest rates for similar obligations"[107]. In line with this reasoning, Danish authorities require pension institutions to use either of the following indices for the purpose of discounting[108]:

- a duration weighted average of three different government bonds plus a swap-spread officially determined and published daily by the Danish FSA[109]
- an estimated yield curve of zero coupon rates published daily by the Danish central bank [110].

All the aforementioned factors determine collectively the present value and changes in any of those variables will inevitably alter the estimated value of pension liabilities as well as technical provisions, thereby exposing institutions to risk.

3.4.2.2 Management of Actuarial Risks

Concerning actuarial variables, it is crucial to take demographic shifts instantly into account as deviations between assumed population developments and reality can lead to severe understating of pension institutions' true obligations. Though, the resulting risk is not of financial nature and is therefore hard to accommodate by adjusting the investment portfolio in a certain manner. In order to

[106] Keintz & Stickney (1980), p.223-224 and Gopalakrishnan & Sugrue (1995), p.35
[107] DepArtment of the Treasury Office of Economic Policy (2005), p. 1
[108] Andersen & Skjodt (2007), for example, p. 48
Note: The option to choose from the two discount rates exists only during a transitional phase, starting from January 2009 it is required to use the latter yield-curve of zero coupon bonds.
[109] The Danish Financial Supervisory Authority (2001)
[110] Jørgensen (2004), p. 386 and Ladekarl et al. (2007), p.12

handle such **actuarial risks**, it is rather important to establish confidence around estimations or employ "classical actuarial methods [as] writing a sufficiently large number of similar policies"[111].

3.4.2.3 Management of Market Risks: Immunization

The discount rate and thereby also the present value of pension obligations change in accordance to fluctuations in the respective reference rates which depend in turn on prevailing interest rates. Such sensitivity to changes in interest rates is often considered as the single most important and biggest influencer of pension liabilities value[112]. It implies a significant exposure of funds to **systematic, financial market risk** which can be managed through appropriate measures on the asset side. In particular, a common practice is to design the pension portfolio according to the principles of **immunization** which means that the respective durations of assets and pension obligations are matched in order to align the sensitivity to changes in interest rates. Duration is a function of the overall maturity or holding period as well as the timing and size of cash-flows during the life of a security/obligation.

Pension liabilities are generally considered to be of relatively **long duration**:

- maturity of liabilities to pension beneficiaries is driven by the length of average working career (normally 30-40 years) and for that reason very long
- cash-flows in form of pension payments commence at the end and as one large sum (lump-sum arrangements) or very late in the life as regular streams (annuity contracts), both cases prolonging the duration of obligations.

Thus, having the intention to match the liability side, assets should posses an equally long or even longer duration. Securities with long maturity and/or high cash-flows late in their lives would be preferred choices for the pension portfolio.

ART

Analysing Art as an investment vehicle against the background of those duration and immunization considerations the following conclusion can be made.

The fact that paintings do usually not provide current income but return only a **substantial lump sum** at the end of the holding period when the Art piece is sold represents in the given context not necessarily a disadvantage. It might be considered as rather positive that cash-flows occur very late as it results in desirable, longer duration.

[111] Jørgensen (2004), p. 382
[112] Ryan & Fabozzi (2002), p. 10 and Austin, Chittim & Wozniak (2006)

However, there are often considerable uncertainties regarding the exact length of holding period as well as the size of sales proceeds which result in problems to estimate a specific duration.

As paintings do not possess over a known maturity like, for instance, fixed-income instruments a reasonable **minimum holding period** would need to be assumed. Due to the high transaction-costs a frequent trading relatively might be rather unlikely and argue instead for relatively long investment horizons (see Section 2.7.3). However, since timing of sales is a critical aspect of profitable Art investments and may be driven by (unpredictable) windows of opportunities, it might be complicated to establish a minimum holding period with sensible confidence.

Even more problematic are the **difficulties** in determining the **value of Art pieces** and anticipating the future development, thereby possible sales prices. In contrast to Bonds and Equity securities for which respective price models exist, valuation of paintings is based on appraisal and entails numerous uncertainties. Although different Art segments behave differently regarding the ease of valuation and stability of prices, pension institutions might nonetheless prefer instruments which provide over more predictable patterns of cash flow, both in terms of size and timing.

Clearly, engaging in immunization activities to manage interest-rate exposure, pension institutions will be unwilling to assume additional risk deriving from any variations in this match and possibly occurring if duration could not be determined with certainty.

3.4.2.4 Management of Market Risks: Derivatives

Since 2001-2002 when the so-called perfect storm hit the Danish pension industry, institutions have started to use more extensively and became quite sophisticated/skilful in utilizing a variety of **derivatives to hedge their exposure to market risks**[113].

The dramatic change in financial climate in the early 2000s which was associated with a significant fall in nominal interest rates and a collapse of global equity prices[114] brought the options embedded in Danish pension plans with minimum return guarantees in the money. Under these circumstances it became apparent that Danish institutions were facing a substantial mismatch between the two sides of their balance sheets and had until then failed to adequately address this issue. In order to better manage their assets and liabilities they did not only optimize their asset allocation policies but also turned on a large scale to derivative instruments[115] to hedge interest rate and equity risk exposure (through interest swaps, swaptions and constant maturity swap floors or equity options and futures, respectively)[116].

[113] see Ladekarl et al. for a detailed discussion of the perfect storm and the use of derivates
[114] Ladekarl et al. p. 12
[115] Ladekarl et al. p. 14
[116] van Dam & Andersen, p. 35

As observers recognise, the experience shows that derivatives seem not only to represent a very effective alternative to the traditional practice of immunization in handling the interest sensitivity of pension portfolios. What is more, they also "allow[ed] pension institutions to determine their asset allocation strategies somewhat independently from the liability side"[117].

ART

The increased use of derivatives could also have positive repercussions for the appeal of Art as it mediates previously raised concerns. With derivatives substituting at least partly immunization as a risk-management technique, the arguments against Art identified in that context should loose in importance.

Furthermore, being able to choose assets more freely and separately from concerns about obligations there appears to be more room for alternative investment vehicles in pension portfolios. Thanks to an altered risk profile as well as freed-up resources, pension institutions could be better able to pursue newer forms of investment, thus in principle also Art. However, in that case the relative performance of paintings compared to other alternative instruments could come to the fore which - as explained earlier - is rather disappointing.

3.4.2.4 Management of Market Risks: Diversification

Next to asset-liability management, the associated immunization efforts or the utilization of derivates, **diversification** can be identified as a key risk-management technique of pension institutions. In this context, the previously made observations regarding correlations and efficient portfolios come to bear from which it was reasoned that Art might play a role as diversifier.

In order to specify those considerations and apply them to the concrete situation of Danish pension institutions, efficient portfolios with target returns in line with the rates guaranteed on CB pension plans have been calculated (see Appendix XIV). Specifically, the target returns for those simulations were based on the average promised rate due in 2007 on all Danish pension institutions' obligations (3.0%, following the liability structure as presented in Appendix XIII) as well as the maximum possible guaranteed rate of 4.5% which establishes the upper limit. However, since the contractual guarantees are made in after-tax terms, the actual returns that pension institutions have to earn on their portfolios should be stated as pre-tax rates, i.e. 3.75% and 5.6%, respectively, when a tax-rate of 24% is assumed[118]. The results clearly demonstrate that with the aim of **minimizing the portfolio variance** at the given return levels, a significant share of funds should devolve to

[117] Ladekarl et al., p. 22
[118] Carøe (2008), see Appendix I for interview details

Bonds (aggregate index) followed by Hedge Funds and also Art. The higher the return target is set, the **larger** becomes the recommended **allocation to Art** giving it credit for the low or even negative correlation with other asset classes. However, if the **actual portfolio allocation** of Danish pension institutions is taken as a starting point the situation changes significantly. Interestingly, on the condition that the share of Equities, Bonds (aggregate and treasury), Property and REITs shall stay the same as in 2007 or be increased when determining the efficient portfolios, there seems to be **no room for either Hedge Funds or Art**.

ART

In sum, calculations confirm that Art could theoretically play an important role also in institutional portfolios thanks to its correlation and therefore favourable diversification characteristics when measured in gross terms. However, taking the **current behaviour of pension institutions** into account which in all likelihood reflects other important concerns to fund administrators the role of Art substantially subsides. Moreover, the limitations mentioned earlier - the fact that computations are based on gross rather than **net returns** and short-term instead of **long-term correlation structures** - apply and further relativise the value of Art. Furthermore, the **implementation** of a diversification strategy including Art could be associated with problems. As mentioned before calculations of correlation coefficients and resulting efficient portfolio allocations are based on index values, i.e. a composite of all Art pieces from a variety of schools and price segments. However, if a sum equal to the recommended share were invested to buy and hold paintings directly, it would be questionable whether the acquired collection of Art pieces would possess the same diversification characteristics as such an index. Although the budget might be large, the price of especially high-quality Art could result in a portfolio being composed of only a comparably limited number of pieces exposing pension institutions to undesirable idiosyncratic risks. On the other hand, if several pension institutions decided to invest funds of the scope recommended by efficient portfolio calculations, the total sum might exceed the capacity of the Art market and drive up prices. Those considerations demonstrate that particularly direct investments in paintings lead to additional impracticalities further diminishing the appeal of Art.

3.4.3 Defined-Contribution Plans: Objectives and Return-Risk Preferences

The most important characteristic of defined-contribution plans distinguishing it from defined-benefit or cash-balance schemes refers to the fact that it involves no liability side. Pension institutions do not guarantee a particular return or ultimate benefit value to participants but act

solely as fiduciaries which might advise but mainly administer on behalf of the beneficiaries. This has important implications for the overall objective, specific return targets and investment strategies of DC plans. All decisions and activities under DC arrangements focus on the **asset side** and the overriding objective is to achieve an adequate **final balance** on each individual retirement account.

If it is assumed that the accrued funds shall provide the participant with retirement income, the accumulated sum should be sufficiently high to finance the living as retiree. Accordingly, the **minimum target value** that needs to be accrued before commencement of the pension should reflect both, the maintenance of a certain living standard as well as the beneficiary's projected life expectancy. Based on this lower limit for the ultimate pension balance a **minimum return target** can be determined which should on average be obtained throughout an participant's active life.
However, the ultimately accumulated pension funds should also provide for certain reserves necessary to cover eventualities in the personal life or general environment. Factors as, for example, a longer than expected life, sickness or inflation can result in a substantial increase of the financial needs post-retirement and should be taken into consideration. Clearly, uncertainty about such variables - which might eat up and exhaust savings before the participant actually dies - represent risks to a beneficiary. The most simple and sensible measure to manage such exposure would be to strive for a **maximization of the yield** and, hence, overall balance of the pension account. Together with the particular risk-profile of individual beneficiaries, this maximum should serve as guideline for the formulation of an appropriate investment strategy and related asset allocations. Though, the specific investment strategies will vary for different DC plan participants as they have **varying expectations regarding minimum returns** (depending, e.g. on their desired standard of living) and **unique risk preferences**. Furthermore, even for one particular beneficiary the investment approach will not be constant but changing over time. Even though the lower limit for average yield remains unchanged, participants will probably alter their attitude towards risk along their active working life.

3.4.4 Defined-Contribution Plans: Investment Strategies and Risk-Management

3.4.4.1 Investment Strategy: Efficient Portfolios

At the **beginning of their career** participants might well be willing to assume **larger risks** in order to achieve the highest possible **capital growth**. With a relatively long time left until retirement, beneficiaries posses the ability to absorb temporary losses and fluctuations in account balances that might result from riskier but in the long-run more profitable investments. Thus, pension portfolios at the early age of participants are likely to comprise a considerable share of long-term, more

illiquid and riskier investment vehicles yielding high returns (similar to immature CB schemes).

However, it is reasonable that this risk-attitude will gradually shift and beneficiaries become more conservative or cautious with regard to their portfolio choices as they approach their **retirement age**. Coming closer to the time of redeeming the pension account, the investment strategy will probably focus on protecting and **preserving the already accumulated wealth**. Having no possibility to count on contractually guaranteed benefit payments post-retirement, participants in DC-like plans will strive to **minimize the market and liquidity risk** imminent near the time of retirement. The resulting asset allocation emphasises most likely securities with lower but very predictable, secure returns over known timeframes. Accordingly, fixed-income instruments might be the preferred asset class at that stage of beneficiaries' lives (comparable to the situation of mature CB plans).

ART

Concluding from the foregoing discussion it appears that Art investments could be of certain appeal to participants in DC or unit-linked plans. More specifically, although Art might be perceived as expensive and risky in the short-term it offers a much more attractive risk-return profile over longer holding periods. The positive effect of **longer investment horizons** comes particularly to bear when the impact of transaction costs is considered, as illustrated in Section 2.7.3. With such characteristics, paintings can be identified to fit generally well into the portfolios of DC scheme participants at the **early stages of their active lives** and long time until retirement.

Though, of course, it is important to consider the **performance** of Art **relative to other securities** with similar attributes, i.e. assets with high (short-term) volatility but superior returns over the long-term. It has, however, already been demonstrated that paintings have also over the long-run problems to compete with the risk-adjusted returns provided by Equities. Thus, focusing merely on risk-return characteristics paintings might even for long-term investors be relatively unattractive.

3.4.4.2 Management of Market Risks: Diversification

Diversification - both within and across different asset classes - is a very effective measure to minimize idiosyncratic risks associated with particular holdings for which investors cannot expect to be rewarded by the market as well as to reduce overall portfolio's exposure to systematic, market-wide risks. It represents the main approach to cope with the investment risk prevalent under DC schemes. In contrast to CB plans, in which pension portfolios might be composed according to a variety of different considerations (especially the nature of obligations), asset holdings under DC

plans do simply have to accommodate the risk-return preferences of the individual participant owning the portfolio. Having the maximization of pension income at a given level of risk or, conversely, the achievement of a specific return at the lowest possible volatility as the only objective, unit-linked portfolios should follow the **allocation suggested by the efficient frontier**.

ART

As could be demonstrated in Section 2.7.4, the **efficient frontier including Art** consistently **dominates** portfolios without paintings and therefore the latter should form part of individuals' pension portfolios in order to minimize risk. Although, this recommendation can only be made with reservations given the **limitations** raised before. Further investigations are necessary which analyse measures to lower **transaction costs** and thereby render the overall holding of Art more profitable. Also, regardless of any possible diversification benefits paintings most likely disqualify from being part of older DC participants' portfolios with only short maturity due to concerns about liquidity.

3.4.4.3 Issue: Implementation

Overall, it appears that Art faces fewer obstacles when being analysed as a possible investment instrument for pension portfolios of DC scheme participants. The risk-return preferences of individual beneficiaries establish the main criteria for investment and asset allocation decisions, in which the personal gusto for or against certain instruments might play a significant role, too. However, it is important to note that individual participants are only able to choose assets from a selection of instruments offered to them by the respective pension institution. If it were seriously contemplated to include Art in DC portfolios it would not be in form of participants buying and directly holding different Art pieces. The **implementation would rather rely** on the respective pension institution providing the **opportunity to invest indirectly** in paintings. That means that an institution would either need to establish a fund for Art investments itself or act as an intermediary or platform through which access to the services of external fund managers is granted.

Particularly the first option might appear quite cumbersome and unprofitable to institutions. Offering an **own investment fund** would not only entail the difficulties related to directly holding paintings, as the development of necessary **expertise, the selection and purchase** of collection pieces or the ultimate management. Moreover, it would also necessitate providing for the proper **organization and administration of the fund**, including securitization procedures and compliance with regulatory requirements. In this context, Peter Carøe of PFA Pension mentioned that a particular deterrent would be the requirement to continuously quote prices - an issue given the

problematic valuation of paintings - and to stand ready to buy back the shares of the Art fund[119]. However, also the other alternative of utilizing **external Art investment funds** might be associated with several issues, as the correct **selection** or the potential for **agency conflicts**. A more elaborated discussion of the dis- and advantages of investment funds compared to direct holdings by pension institutions shall follow in Section 4.2.3.3.

Therefore, even if individual participants considered paintings as an interesting investment opportunity, **organizational and administrative concerns** might prevent pension institutions from offering Art as an asset class in the first place. It should also be kept in mind that - at least at the present moment - the range of products available for DC portfolios does merely include traditional instruments and not any alternative form investment.

3.5 The Impact of Regulation on Asset Allocation

Given the substantial financial clout and social relevance of pension institutions, policymakers take a great interest in the activities and are eager to ensure the well-functioning of the pension system and the players involved. In Denmark, the Danish Financial Supervisory Authority (FSA or Finanstilsynet) is the responsible authority in charge of regulating and supervising pension institutions as well as ensuring appropriate dissemination of information to the public[120]. As shall be elaborated in the following, regulations might directly or indirectly influence investment decisions and thereby also have repercussions for the perception of Art as an investment class.

For a discussion of this topic it is referred to different legal texts which present a valuable source of **primary information**. Although Danish pension funds are in the focus of the investigation at hand, Denmark being part of the European Union is subject to the EU-wide directives on the activities and supervision of institutions for occupational retirement provision (IORP) passed by the European Parliament and Council. The currently prevailing Directive 2003/41/EC[121] provides basic guidelines on pension-related legislation and defines minimum rules to be followed in all member countries. The specific implementation and more detailed provisions applicable to Danish institutions are set forth in the Financial Services Act and all secondary legislation established as a consequence of this act by The Danish FSA. Furthermore, international organizations like the OECD (n.d.) or The World Bank (Davis, 1993; van Dam & Andersen, 2008; Andersen & Skjodt, 2007; Ladekarl et al., 2007) discuss the systems in different countries and in this context often analyse the Danish

[119] Carøe (2008), see Appendix I for interview details
[120] van Dam & Andersen (2008), p. 4
[121] The European Parliament and The Council of the European Union (Directive 2003/41/EC)

regulatory framework as a positive role model. The pertaining literature provides a useful source of **secondary information** on the legal situation and partly also relates those conditions to the investment decisions taken by Danish pension institutions.

The presented conclusions regarding the impact of regulatory specifications on the adoption of Art investments were mainly based on the insights gained from **conversations with practitioners** in the Danish pension industry (see Appendix I for list of interviewees).

3.5.1 Subject Areas of Legislation and Regulations

In line with the provisions of other jurisdictions, the regulations formulated by the Danish FSA address broadly the following subject areas:

- general directives on **governance** of pensions funds
- **accounting and valuation rules**
- specification of **capital reserves** and solvency rules
- regulations regarding the **investment behaviour**
- **information rules**.

In the following, the most important aspects pertaining to those aforementioned subjects shall be presented. When explaining the implications of regulatory specifications on asset allocation decisions and the resulting attitude towards the adoption of Art as an investment vehicle, it shall also be distinguished between the two prevalent pension plans (CB and DC schemes).

3.5.2 Governance Rules

Governance rules for pension institutions concern typically three main subject areas. Firstly, pension fund managers are asked to outline basic **principles for the conduct of business** which reflect the risk profile and capital strength of their entity and ensure the alignment of all stakeholders' interests. Secondly, provisions require the definition of standard **operating procedures and internal control systems**. Thirdly, regulations demand for the preparation of **written guidelines** to documenting the content and conditions of pension products, investment policies and objectives as well as extent of information and communication to customers.

3.5.3 Accounting and Valuation Rules

An important part of accounting rules deals with specifying the methods and variables to be used when determining pension institutions' asset and liability values. Overall, the Danish accounting

regime is considered as very forward-looking and progressive in European comparison as it entails a "full fair value model"[122] that applies to both, the liability and asset side.

More specifically, accounting rules regarding the fair valuation of **liabilities** address mainly the methods of calculating **technical provisions.** Thereby, stipulations deal on the one hand with the mode in which the sum of obligations shall be determined by delineating the types of liabilities to be included and requiring a prudential selection of actuarial variables. On the other hand, they prescribe the interest rate to be used in the discounting process which is pivotal for the determination of fair and market-like values. The Danish FSA decided that a maturity dependent rate as given by the yield curve of zero-coupon bonds would be most appropriate in establishing this goal (see the discussion in Section 3.3.2.1).

Also on the **asset** side the Danish Financial Services Act calls for a measurement and representation of investment instruments included in pension portfolios at their respective market values. Regulations acknowledge the different situation that might exist for various investment instruments with varying degrees of liquidity and therefore availability of market prices. They specify that assets like Equities or Bonds which are traded on active markets and therefore possess readily **observable market prices** need to be recorded at those evident prices. Investments with non-active markets should be assessed by means of appropriate valuation techniques like **economic models** as, for instance, in the case of Property or simply **best estimates** of market values for vehicles like Private Equity[123]. Most importantly, Danish pension institutions are not only required to report all their investments at fair values but also to show any changes in worth - regardless of whether realized or unrealized - in their profit and loss accounts[124].

Those accounting stipulations might impact asset allocation decisions in a twofold way. Determining the prevailing market or fair value of assets requires a**dministrative efforts** and creates thereby **costs**. Clearly, the less liquid the markets and the less observable the prices, the more difficult it becomes to provide a fair estimate and therefore higher expenditures will have to be incurred. As asset values have to be reported on a regular basis, expenses might accrue and negatively affect the cost-benefit trade-off for certain instruments. Moreover, stipulations could influence the attractiveness and **quality** of different vehicles as a **source of funding** (more details in the next paragraph, Section 3.5.4).

[122] Andersen & Skjodt (2007), p. 28
[123] Andersen & Skjodt (2007), p. 30
[124] van Dam & Andersen (2008), p. 19

ART

The implications of accounting rules on asset allocation decisions in general and Art investment in particular have partly already been discussed. In the context of explaining CB schemes' objectives and investment strategies it had been highlighted that valuation principles concerning **liabilities** are of relevance for the definition of technical provisions as well as the decision about risk-management techniques. The accounting of liabilities at market-values (as opposed to book-values) implies an extreme sensitivity of obligations to changes in interest rates which calls for approaches like ALM, immunization or hedging via derivatives in order to manage the exposure. As has already been discussed, each of those approaches affects portfolio choices and thereby the suitability and appeal of Art in a different manner.

The requirement to measure **assets** at their respective market values constitutes a clear issue for paintings as an investment vehicle. Given the characteristics of the Art market presented earlier (e.g. fragmentation, lack of transparency and liquidity), it should be evident that prices for single paintings are not readily observable. Furthermore, no valuation models do currently exist which would allow determining the prevailing values of unique Art works in an accurate and reliable fashion. Thus, undertaking a **fair estimation** would be the only way to account for the value of Art holdings in line with the Danish guidelines. However, this task would **require a substantial amount of knowledge** not only about the Art pieces themselves but especially about market dynamics driving individual prices. This know-how would need to be built internally in the pension institution or acquired from external parties - both certainly costly endeavours. Even, if the pension institutions were able to establish proper procedures and structures to determine and track value developments of Art investments, it would still be necessary to ensure that also authorities concede those reported values as acceptable. That is, accountants who must approve any statements of pension institutions must be able to verify the correctness of determined Art prices and would therefore need to posses necessary expertise, too. Therefore, as the determination of paintings' fair values prior to their actual sale is subject to considerable difficulties, the hassle and costs associated might outweigh any otherwise attractive features of Art investments.

3.5.4 Funding and Solvency Requirements

With regard to funding and solvency regulations, the Danish authorities follow relatively closely the framework laid down by the European Life Directive which is currently not (yet) risk-oriented. Regulatory requirements mandate that pension institutions "have at all times sufficient and

appropriate assets to cover the **technical provisions**"[125]. As stated before, such provisions need to be made in order to ensure that all outstanding liabilities (both, current and future) can be fully funded in the long-run and apply to Danish pension schemes which carry obligations due to minimum return guarantees, here always referred to as CB plans. In line with EU stipulations all types of pension schemes are subject to **legal solvency margins**. The solvency margin for CB schemes which are legally treated as ordinary defined-benefit plans amounts to 4% of technical provisions plus a requirement on the sums insured[126]. The significantly different risk-profile of DC schemes, i.e. unit-linked plans without any guaranteed zero-floors, is only accounted for by reducing the required margin to 1%[127]. This demonstrates that under a regime with fixed solvency margins, the particular risk characteristics of the assets invested in do not directly influence the size of the capital reserves.

However, in order to account - at least to a certain degree - for the varying risk exposures deriving from different asset classes in the portfolio, the Danish FSA introduced in 2001 the so-called **traffic-light system** as a supplementary security mechanism. It is a stress test which simulates two scenarios of increasingly severe changes in relevant variables and measures the effect of such adverse market developments on the solvency status. Most importantly it aims to capture the impact of fluctuations in interest rates affecting bonds or decreases in equity and real estate prices on the capital strength of pension institutions. Though, it also addresses factors as credit, currency or default risks[128]. "The total impact of the stress tests is obtained by taking into account the worst result from either an increase or decrease in stress parameters in the (more plausible) Red and (less likely) Yellow Tests"[129]. Clearly, the practice of stress testing highlights that not all assets are equally eligible to serve as capital reserves and their adequacy to source technical provisions depends directly on their respective risk profiles. Thereby, a greater awareness of pension institutions for the specific risks entered with certain investments is created and the latter is likely to be an important criterion in the organizations' portfolio selection decisions.

ART

The **risk-based approach** to solvency as implemented through the Danish traffic light system might substantially decrease the attractiveness of Art investments to pension institutions, especially **CB plan providers**. Firstly, a practical issue regarding the **formal treatment of investments in paintings** would arise. Since current regulations do not (yet) specify it, it would need to be clarified

[125] The European Parliament and The Council of the European Union (Directive 2003/41/EC), Article 16.1
[126] Andersen & Skjodt (2007), p. 28
[127] Andersen & Skjodt (2007), p. 28
[128] Andersen & Skjodt (2007), p. 49-50
[129] van Dam & Andersen (2008), p. 25

how the stress testing of Art holdings should be undertaken. Though, the procedure for Art will presumably follow the lines for equity and real-estate investments this kind of regulatory vagueness and resulting uncertainty could deter institutions from considering investing in Art. Moreover, the basic principle underlying the traffic-light system might put Art investments at a severe disadvantage. A major implication of the stress testing system is that pension funds are forced to trade-off any potential benefits from riskier assets against the higher costs those might imply because they **contribute to capital reserves only to a limited degree** and must be backed by additional and/or safer assets to achieve required technical provisions. Furthermore, assumptions of the stress testing are applied separately to the different asset classes and do not consider correlation between categories so that the risk of individual instruments but not the pension portfolio as a whole is emphasised. In that manner, vehicles providing normally desirable **diversification benefits** might be rather **neglected**. This presents a major counterargument against Art as it derives its most appeal from the favourable correlation to traditional assets and resulting role as portfolio diversifier. On aggregate paintings cannot compete with the superior returns of other alternative investments as, e.g. Hedge Funds, which could otherwise justify an investment in this rather risky asset class. Only under conditions in which funding is guaranteed and surpluses exist, i.e. in which solvency requirements loose their relevance on portfolio decision of CB pension plans, might there be room for holdings of Art.

In contrast to that the potential attractiveness of paintings might be much higher in **portfolios of DC plans** which are by definition fully-funded status and - though also being subject to certain but small solvency margins - are basically free from restraining solvency regulations.

3.5.5 Investment Rules

Regulatory guidelines concerning investing have the most direct influence on pension institutions' portfolio choices and might therefore explain the hitherto persisting non-existence of and general attitude towards Art investment.

Usually, investment rules can come in two forms, either as quantitative restrictions and/or qualitative guidelines. **Quantitative rules** refer to legal provisions that define limits for the investment into certain asset categories, mostly by specifying maximum levels or **ceilings**. Authorities target with those restrictions holdings of assets considered as relatively volatile or illiquid, thus risky, and traditionally had been applied to Equities, Real Estate, foreign investments or securities of unregulated markets. Other quantitative portfolio restrictions include provisions on **self-investment**. **Qualitative rules** are mainly associated with the specifications and behavioural

guidelines formulated under the **'prudent person principles'**. They entail that the persons responsible and accountable for the operations of pension institutions are granted full discretion over investment decisions. The concerned managers are merely urged to exercise prudence and care in their activities so that fiduciary duties vis-à-vis beneficiaries are satisfied and interests of sponsors preserved[130]. As outlined by the European Commission, the prudential principles to be followed cover typically the five aspects of **security, profitability, liquidity, quality and diversification**[131] (see Appendix XV for a detailed explanation).

Historically, regulatory bodies on the European continent had favoured stricter control of pension institutions and stressed universally applicable quantitative portfolio restrictions. In Denmark, for instance, regulations required pension institutions for a long time to invest at least 60% of funds in domestic debt markets, while equity-holdings were limited to a maximum of 40% and international investments should overall only account for a 'small proportion'[132]. Consequently, Danish funds held traditionally a considerable portion of their portfolios (over two thirds) in fixed-income securities and, especially, mortgage bonds[133]. However, **Denmark** embarked already in the 1990s on a deregulation process and **liberalized** substantially its **investment rules in 2000** when it shifted towards risk-based supervision supported by the formerly described traffic-light system[134]. The European Union followed suit by passing Directive 2003/41/EC which significantly relaxes quantitative ceilings and emphasises qualitative rules of prudential behaviour. Specifically, the EU limited quantitative rules to three areas which in this form also apply to Danish pension institutions:

- **shares and corporate bonds** traded on regulated markets are allowed to make **up to 70%** of assets covering technical provisions
- **up to 30%** of assets can be denominated in **currencies other than that of pension benefits**
- assumption of third-party loans is entirely prohibited.

Moreover, it is stressed that there are no explicit restrictions concerning assets of **risk capital markets** such as Private Equity[135].

Those deregulations have important implications for, especially, defined-benefit and the in Denmark most prevalent cash-balance schemes. They had previously been subject to the most rigorous portfolio restrictions as policy makers had attempted to actively limit the investment risk assumed in order to guard against possible insolvency. However, overly strict limits on supposedly

[130] European Commission (1999)
[131] European Commission (1999), p. V-VI
[132] Davis, E.P. (1993), p.7c Table 6c
[133] Davis, E.P. (1993), p. 28-29
[134] van Dam & Andersen (2008), p. 15
[135] The European Parliament and The Council of the European Union (Directive 2003/41/EC), Article 18.5

risky investments deprived pension institutions from higher returns, limited their diversification opportunities and resulted in a bias towards fixed-income securities, hence, over-exposure to interest-rate risk. Therefore, it was decided to scale back on quantitative restrictions and instead impose only prudent person principles along with specifications of minimum funding and solvency requirements as regulatory mechanisms. This should correct for previously experienced disadvantages and grant more freedom to exploit financial opportunities. Also, the new regime should allow for the flexibility to tailor individual institution's investment decisions to their respective liability structure and contractual obligations.

ART

Loose quantitative portfolio limitations leave explicit room for alternative and more untraditional investments which had formerly appeared prohibited. Formally, there are **no asset ceilings** or other restrictions which would **prevent pension institutions from investing in Art** - if they deem them interesting or important for achieving their unique retirement income objectives and related strategic targets. Though, experts acknowledge that "[t]he flexibility in the current investment regulation is so great that asset allocation strategies are probably more influenced by internal asset/liability considerations and capital rules than by investment rules and limitations per se"[136]. In so far, obstacles and issues surrounding Art which were identified in the context of **funding and solvency rules** might dominate asset allocation decisions and **deter CB plan providers from holding Art**.

Moreover, obligation to act upon **prudential principles** and render account of undertaken investment decisions might result in pension institutions becoming more **cautious about untraditional vehicles**. This kind of attitude might further be nourished by the guideline that "assets shall be predominantly invested on regulated markets" or otherwise "in any event be kept to prudent levels"[137]. Thus, though responsible managers provide over the leeway to act only upon their discretion, they might feel urged to establish unequivocal evidence for their portfolio choices. They might want to eliminate any doubt about the advantages of paintings and the superiority over other assets before investing which - concluding from the analysis so far - cannot be done.
Furthermore, detailed specification of certain prudential principles as the **request for quality** could render Art as a financial instrument more or less attractive. Among others, the criterion of quality entails that business shall be conducted with the **skill of an expert**. In the absence of sufficient

[136] Andersen & Skjodt (2007), p. 29
[137] The European Parliament and The Council of the European Union (Directive 2003/41/EC), Article 18.1(c)

knowledge to "make fully informed decisions and fulfil their responsibilities"[138] the governing bodies are required to seek external advice of respective experts. Pension institutions might either draw on external consultants to obtain temporary assistance and support in developing necessary know-how internally; otherwise, investment and administration of certain asset classes could be outsourced entirely to more specialized portfolio managers.

Such a lack of sufficient skill is likely to occur when it comes to very innovative instruments and less conventional alternative investments. Investments in Art would clearly fall into this category, not only because so far it had hardly been considered by institutional investors. What is more, investing in Art entails very complex processes along which considerable knowledge not only about artistic features but also trends and market intricacies is inevitable (see Section 2). Pension institutions would need to engage in **tremendous learning efforts** in order to acquire the skills necessary to undertake sensible and sound investments in this field. Only if they were convinced that they possess the insights and capabilities enabling them to earn reasonable income and preserve capital they should pursue investments in paintings. Achieving such a position would however first require the **investment of substantial resources** in form of time, personnel and money. It is questionable whether the expected returns (in form of yields or other benefits) could pay off for those expenditures. Moreover, it might not even be possible to build the necessary expertise in-house for **problems of attracting people** with the desired talent and know-how, as suggested by Peter Carøe[139]. Failure to do so would render any attempts to invest in Art [highly] irresponsible and represent clear violations of prudential principles.

Hence, reverting to **external managers** might present a better way for pension institutions to participate in Art while fulfilling their duties of care and prudence. A critical assumption underlying this reasoning is that those external managers are more knowledgeable in the subject area and, therefore, possess a competitive advantage over the institution. However, Danish pension institutions are explicitly held accountable for ensuring that those external portfolio managers adhere to the prudential standards and comply with other regulatory guidelines. Danish legislation states that "[i]f assets of the pension institution are managed by portfolio managers, it is the responsibility of the board of directors that funds are invested within the guidelines and in accordance with the Financial Business Act"[140]. Also this kind of liability demands pension institutions to provide over enough understanding of Art markets and their dynamics in order to adequately select and monitor the entrusted external managers. However considerable **control issues and agency problems** may arise rendering it difficult to guarantee required compliance (see

[138] OECD Insurance and Private Pensions Committee and Working Party on Private Pensions (2006), Annex I 2.1
[139] Carøe (2008), see Appendix I for interview details
[140] van Dam & Andersen (2008), p. 13

Section 4.2.3.3). In the end the meaningfulness of investing in paintings might be challenged considering the associated effort, hassle and potential risk of being accused of non-compliance with regulations.

3.5.6 Information Rules

Information rules entail requirements regarding two main issues. On the one hand they mandate pension institutions to publish **annual accounts and reports** in which they present a true and fair valuation of their assets, liabilities and financial position. Thereby the institutions are urged to distinguish clearly between each type of pension scheme provided[141]. Furthermore, regulation on information addresses also the **communication with members and beneficiaries** of the respective pension fund. It is clearly stipulated that pension fund providers must - at least on request - provide details about issues as the range of investment options available, composition and status of the investment portfolio, the exposure to different types of risks as well as the costs of investments[142].

ART

The first requirement of providing regular **information on accounts** could have an impact on asset allocation decisions and the attitude towards Art investments, especially for pension **plans of CB form**. Since reporting demands a representation of liabilities and assets at fair market values it refers back to the stipulations of accounting and valuation standards as well as the conclusions regarding Art holdings drawn there. As it was reasoned before, the **determination of a painting's value** is a complex task with unreliable results. This renders it almost impossible to continuously track and, therefore, record the value development of an Art portfolio for a presentation in annual reports. A clear concern would be how regulatory bodies reacted to the publication of only approximate market values or which alternative approaches regarding valuation and/or reporting could be considered. Unless the **regulatory treatment** could be unequivocally clarified, pension institutions might fear to be accused of non-compliance or to become subject of investigations, both of which could **harm the reputation** and business of the fund.

The second main theme of information rules concerning **communication with members and beneficiaries** pertains of course to all types of schemes but might be of particular relevance for providers of DC or unit-linked plans. Though detailed information need only to be provided upon request, the European Commission (EC) states that compliance with prudential principles might call

[141] The European Parliament and The Council of the European Union (Directive 2003/41/EC), Article 10
[142] The European Parliament and The Council of the European Union (Directive 2003/41/EC), Article 11.4 c)

for more comprehensive voluntary disclosure and education of stakeholders[143]. As the EC continues, the need for such education and information can vary considerably with the respective audience addressed.

Corporate plan sponsors and their delegates are considered as prudential experts who know about and are well able to understand different types of investments as well as their respective risk-return implications. Accordingly, they could be satisfied with basic, self-explanatory data. Under **CB agreements** pension institutions deal primarily with those sponsors directly and must stand ready to provide convincing evidence for the choice of specific instruments to defend their position vis-à-vis the critical view of 'experts'. As mentioned before, the hitherto analysis rather suggests that Art investments would not bear such scrutiny, especially when being compared to the variety of alternative investment vehicles characterizing the current investment landscape. Each of the alternative securities available seems to be able to outperform paintings on at least one attribute, e.g. Hedge Funds regarding superior returns or derivative instruments for the purpose of hedging.

In contrast to that, pension plan **beneficiaries** are assumed to be "non-experts"[144] who need to be protected from investment and sales pressure risk[145] by adequate information. The more beneficiaries are directly exposed to risk associated with pension fund investments, the higher will be the demand for communication. Consequently, **DC schemes** under which the participants choose their individual portfolio composition themselves and also bear all investment risks might call for exceptionally high education and disclosure efforts. If plan providers were unable to achieve sufficient understanding of investment products and raise awareness of the risks and costs entailed, they might be accused of violating their fiduciary and prudential duties. Though, official authorities might not hold them accountable and impose penalties, pension institutions surely want to prevent any loss of trust from their clients which could otherwise lead to a decrease in goodwill and ultimately business[146]. In order to avoid such a situation, pension institutions might offer participants in unit-linked plans only to choose from investment vehicles which are relatively simple to grasp and which up- and down-sides are readily identifiable. Against this background, pension institutions could consider the holdings of Art as too complex and unpredictable as to be able to properly explain all intricacies to a layman. The costs in terms of the effort and resources spent on education as well as reputational risk would probably outweigh by far any benefits of Art investments.

[143] European Commission (1999), p. V-VI
[144] European Commission (1999), p. VI
[145] European Commission (1999), p. VI
[146] Carøe (2008), see Appendix I for interview details

3.6 Conclusion

A summary of the preceding discussion and the most salient characteristics of paintings in conflict with the investment criteria of and regulations imposed on pension funds is presented in Table 2).

The analysis has revealed that one cannot make one single, universal conclusions about the attractiveness of Art as a financial instrument. It became apparent that depending on the type of pension scheme considered, the **suitability or inappropriateness** of paintings as an element of pension portfolios **can substantially vary**. Under **CB plans**, for instance, the objective for solvency and the often resulting asset allocation according to immunization principles along with strict legal requirements for capital provisions and reporting pose definite obstacles given the **difficulties and uncertainties** of Art **valuation**. Regarding **DC schemes, no such direct barriers** to the holdings of Art exist as beneficiaries can select portfolio assets according to their individual preferences free of any restrictions. However, individuals first need to have the choice to select Art which hinges on pension institutions providing them this kind of opportunity. Institutions, though, may shun from offering the option to invest in paintings as they do not want to expend the **administrative efforts** required (the organization of an own fund or selection and monitoring of external funds) and commit to the associated **prudential obligations** (education about all investment aspects). Moreover, under both types of pension plans the **maturity** of respective funds or accounts results in different relative attractiveness of paintings. Maturity implies higher liquidity needs and increased risk averseness to which the **high illiquidity** of Art markets runs counter.

Thus, barriers to Art investments under different pension schemes and maturity conditions might be of varying character as well as severeness and may even be mediated by certain factors (e.g. the use of derivatives replacing immunization as a hedging tool and thereby related issues). Nonetheless it must be acknowledged that paintings do not seem to provide over a competitive advantage distinguishing it from any other instruments. On the contrary, in comparison to other vehicles the performance of Art is rather weak: transaction costs and other expenses diminish substantially the profitability of Art and, what is more, in combination with other practical issues of direct holdings challenge the otherwise most appealing feature of paintings, i.e. the provision of diversification.

In sum, the potential benefits to a purely financially motivated investor seem by no means to outweigh the costs of investing in Art, which not merely refer to monetary investments but also comprise, for instance, expenditures of human resources and time for the development of expertise, administration and monitoring or possible losses of reputation and business.

Table 2: List of barriers deterring pension institutions from investing in Art

		Cash-Balance Schemes		**Defined-Contribution Schemes**	
		low maturity (focus: funding objective)	**maturity (focus: liquidity objective)**	**early stage of active life (focus: capital growth)**	**late stage of active life (focus: capital preservation)**
Idiosyncratic Characteristics of Art	**knowledge requirements**	substantial **investment of resources** (time, personnel, money) to build know-how need for **external assistance from experts** and subsequent control and monitoring **limiting diversification** and activities across various Art segments			
	transaction costs & expenses	**weak financial performance** relative to other (especially alternative) forms of investment moreover: transaction costs result in **longer holding periods** **weaker evidence for diversification** opportunities **decreased liquidity** of Art market, therefore also lower efficiency			
			mismatch between required long holding period and short investment horizon of fund		mismatch between required long holding period and short investment horizon of beneficiary
	illiquidity	no issue per se but: insufficient **(il)liquditiy premium**	*lump-sum disbursement*: issue for **successive dissolving** of asset base	no issue per se but: insufficient **(il)liquidity premium**	time of *retirement commencement*: issue for **dissolving** of pension account
	lack of regular income		*annuity disbursement*: no possibility to accommodate term structure of cash-outflows		
	complex & unreliable valuation	issue for **immunization** (no determination of duration)	*lump-sum disbursement*: **compromising solvency** due to uncertain sales proceeds		time of *retirement commencement*: **compromising final balance** due to uncertain sales proceeds
Regulatory Framework	**accounting & valuation**	difficulties, hassle and costs of **continuous estimation of fair value** uncertainty regarding **regulatory bodies' acceptance** of estimations			
	funding & solvency	**regulatory vagueness** concerning formal treatment under stress test **lower quality as source of capital reserves** **low importance** of possible **diversification benefits**, due to focus of risk-based approach on individual risk of asset classes			
	investment rules	**prudential principles**: necessity for quality and skill of an expert (development of expertise) responsibility for compliance of external managers (control issues)			
	information rules	**annual accounts & reports:** issue about Art valuation possibly **compromises compliance reputation** **communication with plan sponsors:** difficulties to present **unequivocal evidence** for financial reasoning		**communication with beneficiaries:** issue of educating laymen comprehensively about intricacies, risks & costs, **compromising prudential duties & reputation**	

4. ACTIVE MANAGEMENT OF ART INVESTMENTS

4.1 Introduction

In the previous sections, the attractiveness of investing in Art has been evaluated based on general risk and return characteristics as well as their performance on pension institutions' overall investment criteria. The conclusion of this assessment gave rather mixed evidence regarding the appeal of Art as part of pension portfolios. Holdings of paintings posses some attractive features, e.g. in terms of diversification, which suit pension funds' requirements well. However, numerous barriers have been identified ranging from high transaction costs and expenses, which diminish overall financial performance, to valuation difficulties or liquidity issues, which conflict directly with certain investment approaches and regulations (see Table 2 for a summary). In the following it shall be investigated whether and how some of the main obstacles currently deterring the pursuit of Art investments could be removed or at least alleviated.

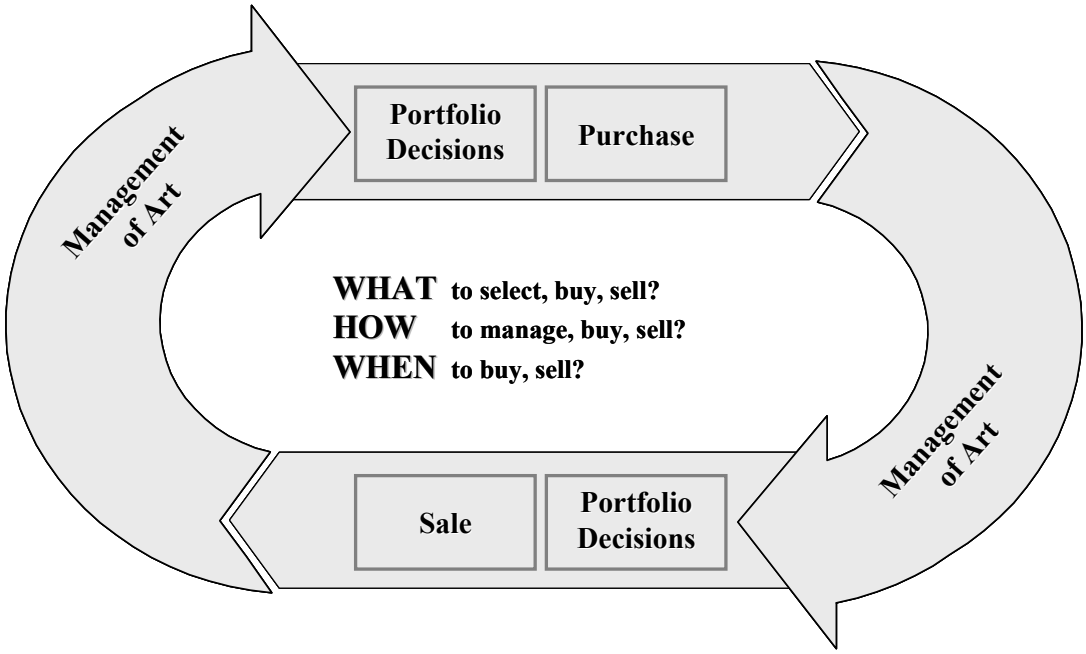
Before discussing specific measures, however, it needs to be recognized that for Art to become a worthwhile investment from a financial perspective, an **active approach** is absolutely inevitable.
As was illustrated already in the initial discussion of the peculiarities of Art, paintings resemble in certain aspects commodity goods, particularly with regard to their **lack of income return**. As Scott[147] puts it, Art provides dividends in terms of aesthetic pleasure or 'convenience-yield' but not in monetary form. Particularly considering holding of Art for financial purposes devoid of any motives of enjoyment, a passive buy-and-hold approach would be tantamount to discarding potential dividends.
Furthermore, it became apparent that the Art market is very different from the markets of most traditional financial instruments and according to Art expert David Weil represents "the last remains from the medieval feudalistic economy"[148]. This different nature as well as the organization and certain dynamics of the Art market give rise to **inefficiencies** which could be considered as disadvantages associated with Art investments. However, they do simultaneously also represent opportunities for higher returns if exploited through an active strategy.

Thus, the return-oriented Art investor needs to look for and exploit opportunities along the **Art investment process** (see Figure 5) in order to counteract the disadvantages connected with Art and turn paintings into profitable investments. It is necessary to make "active management decisions

[147] Scott (1994), p. 66
[148] Weil (2008), see **Appendix I** for interview details

regarding the selection and care of the assets and the timing of buy and sell decisions"[149]. In the following, the specific strategic options available at the different stages shall be further investigated and their potential to improve the competitive disadvantage of paintings be evaluated.

Figure 5: Art Investment Process



Source: Own creation.

Pension institutions considering Art investment can utilize the insights in a two-fold manner:

- as a **model for direct-investment activities**, where identified strategies serve as a source of inspiration for actions to be undertaken or at least point out potential issues and areas for future knowledge development or
- as a **guideline for indirect-investment approaches**, where discussed strategies give useful orientation, thus help in selecting, evaluating and assessing Art investment funds.

Given the limited amount of literature on this topic the strategic options for active Art investment management were developed on the basis of theoretical as well as practical considerations. On the one hand, the reflection upon the idiosyncratic characteristics of Art and, in particular, the determinants of Art prices served as a useful reference point for possible strategic actions. On the other hand, insights gained from Art market experts were utilized to elaborate on commonly recognized and potential future best practices leading to successful Art investing.

[149] Scott (1994), p. 66

4.2 Opportunities for Active Management along the Art Investment Process

The Art investment process can be disaggregated into three phases: firstly, investors have to make **decisions about the composition of their Art portfolio** which most likely precede directly the **purchase or sale** of certain paintings and subsequently, Art pieces included in the portfolio might be **actively managed**. The process constantly continuous and the transition between the different phases is smooth, meaning that considerations pertaining to one phase are not isolated but decisions have direct implications for the choices to follow at other stages, too. Importantly, though, each of the different choices and activities along the process might alter substantially the overall performance. The details concerning each step shall be further elaborated in the following.

4.2.1 Portfolio Decisions

Portfolio decisions have the question of 'what to invest in' at their very core. They address more general, strategic as well as more concrete, tactical issues and accordingly include choices about the composition of the overall Art portfolio as well as the selection of single paintings. Both types of decisions can directly influence the risk-return profile of the Art collection and change the profitability of the undertaking. Furthermore, the choice for a certain collection can have direct implications for the set of management approaches being most suitable and vice versa.

4.2.1.1 Strategic Portfolio Decisions

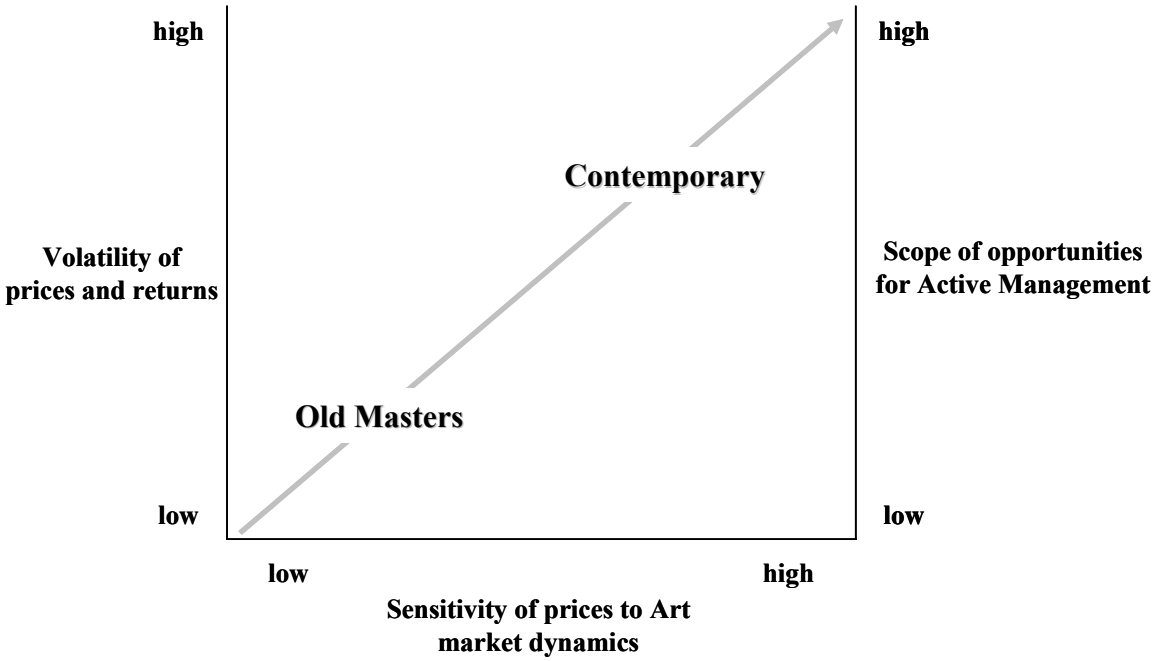
Strategic portfolio decisions are tightly related to the overall purpose and objective that investors seek with an investment in Art. Following from the previous discussion, institutional investors will most likely pursue either of two goals when investing in paintings: on the one hand, they might strive for **diversification** of their pension portfolios; on the other hand, the **generation of surpluses** by means of Art might represent a motivating factor. Both have very different implications for the composition of Art portfolios, most importantly regarding the perception of different sub-segments of the Art market.

With the purpose to **diversify** and generally minimize pension portfolio risk, the main task is to determine the optimal allocation of funds to both, Art as an asset class as well as the different sub-segments of Art. That is, it is sought to achieve a well-balanced position across different investment instruments as well as within the Art portfolio itself. The decisions about the composition of the Art portfolio will most likely stay on a rather aggregate level and be driven by the different segments' performance on **financial criteria** at the core of **traditional portfolio management**. Thus, the

return, standard deviation and correlation characteristics of different categories of paintings will determine how much of the total funds provided for Art investments will be allocated to each.

In contrast to that, if institutional investors are striving for **excess returns** it is necessary to make more deliberate choices and actively seek opportunities. This implies also that not all Art segments will receive the same attention but rather that a focus on certain categories of particular **strategic relevance** is likely. This is because Old Masters, Modern or Contemporary paintings vary not only with regard to their financial performance, as reflected in diverse return, volatility and also correlation features. What is more and partly underlying the observable risk-return profiles, the segments differ also in terms of the dynamics they follow or the factors by which they are influenced (see also Section 2.2.5). This distinction becomes most apparent when comparing Old Masters with Contemporary Art. On the one hand, there exists an over centuries established cultural consensus concerning the value of **Old Masters**, accordingly, prices can be quite reliably estimated and follow usually a relatively stable path. Hence, the returns on the typically quite expensive pieces of this segment are rather moderate but relatively certain. On the other hand, prices for **Contemporary** paintings are only contingent on currently prevailing supply and demand conditions and are for that reason also particularly susceptible to fads, fashions and associated fluctuations. Therefore, it is not only hard to predict the development of values but prices can also be very volatile which in turn results in a wide distribution of returns ranging from large losses to attractive profits. Clearly, such differences in volatility along with varying degrees of information availability and therefore efficiency suggest that investing in the OM and Contemporary segments is associated with different levels of risk. However at the same time the distinctive features also imply a **different potential for excess return**s and give rise to a **different set of options for active management**. The higher the sensitivity to external market influences and volatility, the broader is the scope of active management options available as illustrated in Figure 6 (details on active management opportunities follow in Section 4.2.3 Management of Art). In line with their respective positioning on those dimensions, different segments can take on very different roles in the strategies pursued and Contemporary paintings, for instance, might be more suitable for an Art portfolio created with the purpose to generate surpluses.

Figure 6: Relative position of Art sub-segments on financial and strategic criteria



Source: Own creation.

4.2.1.2 Tactical Portfolio Decisions

Once a certain strategic direction has been set and the overall allocation to different Art segments been decided on, the transition to **tactical decisions** is relatively seamless. More concrete choices concerning the composition of the Art portfolio, i.e. the selection of particular paintings to be included, are in order. Those decisions are still closely related to the strategic objectives and depending on whether diversification or surpluses are desired, distinct aspects are to be considered.

In the case of **diversification**, the detailed selection of specific paintings in each segment is likely to be rather arbitrary. Theoretically it would be desirable to compose the portfolio of Art pieces which help accommodate best the targeted correlation and diversification characteristics. However in practice, the choice of paintings is probably rather driven by **budget considerations** as well as the simple availability of an **opportunity to buy or sell**. With a given proportion of funds to be allocated to, for instance, the OM segment only a certain number of paintings might be acquired as each piece is relatively expensive and overall supply or offers are rather limited - conditions which leave the investor not much room for discretion.

With the intention to **generate excess returns** on paintings, tactical choices will be more concrete and deliberately target paintings which are believed to be undervalued or provide otherwise over high potential to appreciate in value in the future. Depending on the beliefs of the investor and his

level of expertise, the criteria for the selection can be manifold but most likely be related to on one ore more of the previously identified value drivers of Art (see Section 2.4).

If one were persuaded of the existence of the **'Masterpiece Effect'** and believed that the most expensive paintings deliver the highest returns, a reasonable approach would be to employ **price range** as a criterion. Though, as explained before, the evidence for this phenomenon appears mixed.

Another sensible strategy could be to select paintings and artists for the portfolio by means of an **Art dealer**. Certain Art dealers assume the role of market creators and market movers who do not simply give a sales floor to but who very successfully support and promote new artists. The artists patronized by such dealers as Saatchi or Castelli - who are highly respected and recognized as a reference point for quality by the Art community - increase usually quickly in popularity and thereby price[150]. Hence, trading on the cues given by those recognized dealers or collaborating directly with them could be a way to compose a promising Art portfolio.

Otherwise, an investor who is very versatile on the Art market and possesses deep insights over established artists as well as newcomers, dynamics and trends might be confident about the potential of certain **artists** and decide to pick **particular paintings** directly.

4.2.2 Purchase and Sale

As mentioned before, the decisions on portfolio composition are usually followed by the purchase or sale of paintings by which the choices made are implemented. The issues that need to be dealt with in this phase centre on the questions of 'when', 'how' and 'where' and accordingly concern the **timing**, choice of **channel** as well as the **geographical market**. All of the aspects can influence the potential return to be achieved, but especially the latter questions of 'how' and 'where' might have a decisive impact on the size of costs incurred.

4.2.2.1 Timing

The optimal timing of transactions can be very essential for any investment on financial markets but might be of even higher relevance when dealing with Art given the relatively high volatility of the market and the absence of any other source of return but sales proceeds. In order to determine the right moment for a transaction, investors need to make certain assumptions about the future development, decide whether a positive trend can be expected or a down-turn looms and then draw the respective conclusions for a sale or purchase. Identifying and following signals for a certain development of Art values is therefore crucial.

[150] Weil (2008), see Appendix I for interview details

Several researchers have investigated the **predictability of the Art market on aggregate** and found that there is certain evidence for a co-integration of Art and finance, at least over the short-term. As Chanel[151] concludes, "**stock exchanges** may be considered as **advanced indicators** to predict what happens on the art market". Such relation appears reasonable considering that **wealth** is a substantial driver of Art values: economic changes result in concomitant shifts on the financial markets which are then passed on to the Art market as generated profits are reinvested in paintings. Thus, since alterations in economic conditions affect through financial markets the spending power and number of potential buyers, thereby the future sales price of paintings those might serve as a guideline for timing decisions.

Concerning the **trends of specific Art segments or artist**, the activities of art dealers, prominent collectors or other so-called market makers might be regarded as major indicators. This is tightly related to the considerations undertaken in the context of Art portfolio composition where it had been explained that recognized and powerful participants can through their decisions directly influence and move the Art market. Consequently, it may be useful to observe closely those people's buying as well as selling behaviour in order to obtain cues for future market developments. Though it might be questionable whether following their lead can yield excess returns and the profitability is likely to hinge on the time lag to the actions of market makers.

Except for the previously mentioned factors indicating certain windows of opportunity, the **optimal holding period** for paintings might play an important role, too, especially concerning the timing of sales or if investors aim for diversification. The analysis of price indices has revealed that returns on Art investments display much stronger fluctuations when the period between the sales is short[152] whereas volatility over longer investment horizons successively decreases. Also taking the negative impact of transaction costs into account, the improved risk-return relationship over longer holding periods could induce investors who are rather averse to active trading to target longer time spans between purchase and sale of their Art investments.

4.2.2.2. Choice of Channel and Geographical Market

The decisions of 'how' and 'where' to buy or sell paintings for an Art portfolio concern the selection of optimal channel and geographical location.

In line with the model of the Art market and its participants in Section 2, a variety of **channels and modes** might be utilized to sell or buy paintings ranging from auction houses, to Art dealers and

[151] Chanel (1995), p. 527
[152] Stevenson (1990), p. 7

galleries to direct transactions between interested parties. The concrete choice might be influenced by the following considerations.

Firstly, the amount of **transaction costs** incurred can substantially vary with the channel selected: for a seller the charges can range from a low of 0% to 2-3% for sales through dealers up to 10% premia due on hammer prices achieved in auctions[153]; for a buyer the value of auction premia might even assume values of 20% to a high of 30%.

Furthermore, the **prices obtainable or payable** can diverge for different channels due to the size and character of the respective target audience. In an auction, for instance, a relatively large group of potential buyers is simultaneously presented with an object and offered the opportunity to purchase. This could result in higher prices if buyers start competing with each other and the typical dynamics of a bidding process take effect. Such competition might be substantially lower or at least of different nature for paintings sold through dealers and direct channels, as fewer interested parties can be reached. Though, not only the size but also the composition of respective audiences might vary for different sales modes which in turn can also impact the level of reservation prices and overall willingness to compete. Auctions might attract people of diverse backgrounds, with different levels of expertise and rather undefined preferences. People might have an interest in a specific theme, segment or movement but be relatively indifferent between specific paintings and therefore unwilling to bid more than a certain amount. Conversely, galleries might draw the attention of more knowledgeable persons intrigued by particular artists or the selection of paintings currently promoted. If a painting does not fit the taste and current demand of the clientele, the range of prices obtainable will be rather limited; in the reverse case, however, offers might be virtually unlimited.

The **segment and type of painting** could be decisive in the choice of channels, too, because not each piece of Art can equally be offered or acquired through each channel. Contemporary Art works - especially if their primary sale is concerned - are more likely to be marketed through dealers and galleries which often do not only sell but actually create demand in the first place. Old Masters, on the other hand, are traditionally offered during the sales of big auction houses or traded between art connoisseurs directly.

Furthermore, Art investors have to decide on a **geographical market** on which they want to sell or purchase paintings for their portfolio. This choice might concern the selection of a specific country or even city and generally follow a similar reasoning as the one applied in the context of sales channel. Most importantly, several studies have identified significant differences between geographical areas, both in terms of transaction costs as well as prices achieved. This might be

[153] Haugard (2008), see Appendix I for interview details

explained by the different development stages of certain locations, the scarcity of some or abundance of other types of Art as well as local variations in taste.

The respective dis- and advantages of channels or markets will have to be traded-off against each other and depending on the specific transaction concerned, i.e. the individual painting or artist considered as well as the intention of sale or purchase, very different choices might appear optimal. Overall, the strategic role and impact on the profitability of Art investments attributable to the selection of channels and market places can vary substantially. It is possible that the exploitation of price differences between sales modes and geographical locations builds the core of an arbitrage strategy. Otherwise, the selection of certain partners and representatives might be a crucial element of and support another active management approach, as in the case of market development or creation (see Section 4.2.3 Management of Art). Alternatively, the decisions might be of lower importance and simply represent the last step of the investment process in which the efforts of other steps are reaped.

4.2.3 Management of Art

After having composed and holding a certain portfolio of paintings, it is in order to consider 'how' and which parts of the portfolio to actively manage so that the overall profitability is improved. Possible strategies usually lie on a continuum ranging from a focus on the reduction of costs to the creation of additional revenues and systematic enhancement of the value of Art investments. In the following four possible approaches shall be exemplarily presented and especially their varying implications and suitability be highlighted.

4.2.3.1 Economies of Scale

Certain elements of the costs, for example transaction, insurance and even advisory fees might be reduced if investors conducted transactions of higher than normal value and volume so that certain **economies of scale** can be reaped. This is likely to be the case if institutional investors as the here concerned pension institutions or specialized Art investment funds were considered which both strive to establish relatively large portfolios compared to average private, wealthy investors. Moreover, pursuing Art investments for financial motives as opposed to collecting paintings for aesthetic reasons will most likely imply a more active approach to the management of Art and consequently result in more frequent transactions. Therefore, the potential scale, frequency of transactions and concomitant more long-term character of relationships could bring institutional investors into a favourable bargaining position towards different service providers.

Granting certain volume discounts is, for instance, a very common practice among **auction houses**. Whereas it is unfeasible to distinguish during an auction process between different buyers and in this context to give powerful and large business partners discounts, there is more room to negotiate seller premia: the more pieces are put on auction, the lower the seller's fee will become. Also with regard to **Art insurance** it seems to be generally possible to leverage economies of scale as Jan Isaksen, insurance broker with this area of expertise, confirms[154]. Although the insurance policy terms are mainly determined by the value of paintings on the black-market and the related likelihood of thievery, contractors have certain leeway to negotiate rebates.

Altogether, efforts to leverage economies of scale are usually **not** associated with any **additional investments** of resources and related costs, neither should they introduce new nor increase existing risks. A necessary pre-condition would merely be that Art investors achieve certain scale in their activities, can position themselves as powerful market actors and in the following establish respective business partnerships. Since the strategy builds more on the principles of bargaining power than on any characteristics of Art itself, economies of scale should generally be obtainable for paintings of any Art segment.

4.2.3.2 Renting

The option of renting Art pieces bears the potential to simultaneously address several issues related to investing in paintings: the lack of recurrent income, high cost pressure and value enhancement.

As was discussed before, the lack of recurrent income can impede meeting current pension obligations or imply overall larger exposure as highly uncertain sales proceeds represent the only source of income. However, if paintings were rented out to organizations or private persons who derive utility from the aesthetics of Art - and are willing to pay for this - financial investors could tap into an **additional source of revenue**. In this way, an increase in the overall income, hence return, could be achieved as well as more regular, earlier streams of cash-flow be generated.

Alternatively, renting might allow to **share** or to **avoid entirely some of the expenses** normally incurred on Art holdings. In particular, transferring Art pieces to a tenant or lessee would release the actual owner at least temporarily from the need to store the paintings and allow saving on the associated costs. Furthermore, it might be reasonable to include certain stipulations in the leasing agreement which commit the lessee to assume part of the insurance or maintenance costs.

Lastly, renting of Art might also be able to **enhance the value of paintings** as a side-effect when the temporary possession by a lessee increases the positive awareness level and name recognition.

[154] Isaksen (2008), see Appendix I for interview details

The interest of well-known collectors or famous museums in lending could be regarded as a quality reward to the paintings concerned and lead to a transfer of the parties' good reputation to the Art pieces, consequently an increase in value and prices (see also Section 4.2.3.3).

Nonetheless, potential risks and additional costs might diminish the aforementioned benefits. Clearly, the **physical risks of damage or theft** might increase when paintings are more frequently moved, exposed to different environments and conditions. Those refer to factors which might significantly reduce or even irrecoverably destroy the value of Art pieces - currently one of the greatest concerns to museums and other Art owners[155]. Generally though, **insurance** policies can be taken out which cover all of the aforementioned types of risks and would also remain in effect if paintings were rented out, **without** necessarily resulting in **additional charges**. According to Isaksen, in order to maintain insurance protection it must merely be ensured that potential lessees meet required security standards[156] which lessors could provide for by respective clauses in leasing contracts. Nonetheless, the procedure might result in additional efforts and **costs for contracting and monitoring**. Moreover, search-costs, i.e. expenditures for identifying groups of potential customers as well as establishing contact to and relationships with specific parties would have to be incurred. Overall, the activities of searching, contracting and monitoring are of very operational nature and belong more to the typical **responsibilities of a separate commercial business** than to the financial management of assets. Thus, the actions associated with the strategy of renting seem to go beyond the competence area of pension institutions and therefore do not lend themselves to be pursued by institutions directly. Instead, pension institutions would need to utilize external service providers who specialize on the business of renting and therefore possess over the necessary skills.

However, a very fundamental issue of different nature is that there seems to be **no organized rent market at the present moment** which would allow any investor to consider renting as a strategic option to improve the performance of Art investments. Given the possible benefits, creating such a market would undoubtedly be of interest to Art owners, however, the interest and **demand** of potential lessees for such services are less clear and might also **vary for different Art segments**.
For example, it is reported that the New York based Fernwood Art Investment Fund has been successful in reducing its costs by lending and exhibiting its Art investments at institutions[157] - thereby providing evidence that **organizations** might be responsive to the idea of renting. There are no indications which would suggest that such organizations have specific preferences regarding a

[155] Uldall (2008), see Appendix I for interview details
[156] Isaksen (2008), see Appendix I for interview details
[157] Forbes (2004)

certain type or movement, therefore could show **demand for any Art segment**. Moreover, there might exist the opportunity for a rent market among **museums** in order to better organize the exchange of paintings among them which takes quite frequently place but follows currently the principles of barter trade. According to Møller, introducing in this context more traditional market-like arrangements based on contracts and monetary transactions could remove prevailing inefficiencies[158]. Though, if established, this would probably only be a market for a very specific Art segment, namely the **most expensive and exclusive paintings**. Those paintings are to a large extent owned by museums anyway so that leasing would most likely continue to take place between the institutions and not open new opportunities for institutional investors holding Art. **Wealthy individuals** who are usually very interested in high-quality, expensive pieces of Art might be rather **unsusceptible to the idea** of renting because a significant part of their motivation is usually related to the direct ownership of Art and the status derived from that. Other **private persons,** though, who are unable to afford or not willing to purchase but nonetheless very interested in Art might represent a target audience for the concept. At present, already several companies address this customer segment[159] but mainly offer to rent-out or lease **paintings at the relatively low price end** which probably does not coincide with the composition of institutional Art portfolios.

In sum, the concept of renting seems to provide a positive cost-benefit ratio and presents itself therefore as an attractive strategy for Art investors, although, it would be necessary to make use of external service providers to exploit this opportunity. For this to happen, the rent market needs to advance and especially the segment of organizational customers whose demand might fit best the portfolio of institutional Art investors needs to be developed further.

4.2.3.3 Market Creation and Development

The prevalence of information asymmetry and high degree of irrationality characterising the Art market are often considered as major disadvantages and sources of risk associated with the investment in paintings, however can also open opportunities for excess returns. A capable, skilled investor might play on exactly those inefficiencies to create and move the market (or certain segments) in a desired direction. This strategy basically aims to enhance the **awareness level and name recognition** of selected artists in order to affect the preferences of potential buyers and thereby stimulate demand for the works concerned. The reasoning that higher awareness results in greater appeal to a larger segment of buyers, therefore higher demand and prices is reflected in the fact that experts explicitly consider those aspects as important criteria in the valuation process. Art

[158] Møller (2008), see Appendix I for interview details

[159] Note: Examples for companies renting Art in Denmark are among others Gallerie Brænderigñarden Horsens (www.gb-h.dk), www.kunstleje.dk or ART'N'Time – Kunstudlejning & Kunstformidling (www.art-n-time.dk)

advisory services like the one of Citibank, for instance, put great emphasis on the value of name-recognition[160]; likewise auction houses take the exposure level and locations specifically into account in their estimations and often highlight such facts in auction catalogues[161], too.

More specifically then, the awareness might be heightened by utilizing various means ranging from collaborations with powerful market participants to promotion at different occasions or 'advertising' in media of relevance to the Art world. As already explained before, **well-known dealers or collectors** are often considered as important reference points and therefore are able to influence Art market developments through their actions. A phenomenon which is well summarized by Art expert David Weil who comments that "the person behind the artist is more important than the Artist"[162]. In the context of tactical portfolio decisions or timing of transactions, it was reasoned that such 'market makers' can serve as a useful guideline for picking promising artists or deciding when exactly to enter or exit certain segments. However, taking the considerations a step further, instead of observing and interpreting insiders' actions rather passively from the outside, investors might **utilize those influential persons as instruments** to create or steer the market in a direction favourable for the paintings already owned. In a similar fashion, different **media or occasions of the Art life** which might otherwise represent useful sources of inspiration and information or give important cues regarding market developments could also serve as tools to be used in the investor's interest. **Art fairs**, for instance, are intended to facilitate the meeting and exchange of different market participants but might also be regarded as a platform to create publicity and thereby advance new artists. Otherwise, **newspapers and magazines** do not only report objectively on events and occurrences but can also act as taste makers themselves by proclaiming new artists, trends and developments. Moreover, positioning paintings in **exhibitions of recognized museums** can arouse desired attention of media and buyers directly as well as induce a transfer of the displaying institutions' good reputation onto the artist promoted - a quality reward reflected directly in prices.

Evaluating this strategy of creating and moving markets, it must be recognized that the **effect** of the various efforts expended to promote and campaign for specific artists **cannot be controlled**. Accordingly, the specific impact on the value and prices of certain Art works is not to anticipate. What is more, it is by no means guaranteed that the activities yield any positive results but might in the **worst case even decrease the value**. The media might present things in a different light than desired, not only positive but also negative associations might be conveyed from institutions, dealers and experts, or affirmative campaigns could be regarded as displeasingly obtruding - all

[160] Rohleder (2000)
[161] Haugard (2008), see Appendix I for interview details
[162] Weil (2008), see Appendix I for interview details

aspects which could harm the perception of artists and their paintings. Moreover, over-exposure might diminish the perceived exclusivity and scarcity, thus status and thereby value of Art pieces. Hence, the prospect of success or risk of failure hinges significantly on the appropriate selection of channels, careful choice of strategic partners as well as adequate 'dosage' of activities.

As a necessary precondition the investor needs to possess over a thorough **understanding and extensive knowledge of the Art market** in order to identify the participants to collaborate with or media to communicate through. Beyond mere expertise, though, this active management strategy requires the investor to be deeply involved in the market and to provide over **access to as well as influence over key players** - a capability which relies on a network built over years of interaction.

Another aspect, rendering the approach of varying **effectiveness pertains to the segment or artists selected** as target of the promotion activities. Old Masters and Contemporary Art differ substantially regarding their value determinants and consequently also their receptiveness to external market influences as, for instance, promotion efforts. It seems unlikely that masterpieces which reputation and associated value has built up over centuries could be (noticeably) changed by any of the suggested tactics and if so, the costs would be disproportionately high. In the Contemporary segment, though, the situation is fundamentally different as tastes and values are not firmly established yet. Here the issue is to trade-off the costs and prospects of repositioning an already known artist against those of introducing a newcomer: acquisition costs might vary and therefore require different capital appreciation to turn investments profitable; more resources might be consumed for changing opinions already formed about an artists; recognition might be achieved, expand or vanish completely. The choice is likely to be of very subjective nature and rather follow intuition than a rational cost-benefit analysis due to problems of quantification.

4.2.3.4 Art as Collateral

Another option to mediate obstacles faced by Art investments could be to use paintings as collateral and borrow capital against them. On the one hand, this would **increase the liquidity** of Art investments; on the other hand, it would also **reduce the opportunity costs** associated with paintings - especially if longer holding periods were assumed - because borrowed funds would be available for new investments. So-called term and bridge loans can assume values of up to 50% of the low-end price estimates of paintings and thereby free a significant amount of the capital otherwise locked-up in the Art investment[163]. Moreover, since the Art pieces do not need to be moved or otherwise physically changed but can simply stay in their usual storage facilities, no

[163] Art Capital Group (2008)

damage is risked that could cause the paintings to decrease in value[164].
Overall, using Art as collateral is not a new phenomenon but has recently increased in popularity and been accompanied by a rise in the number of providers. Currently, loans are provided by organizations ranging from the big auction houses as Sotheby's and Christie's over the private wealth departments of large banks as Bank of America (U.S. Trust) or Citigroup to specialized financiers as Intelligent Funding or Emigrant Bank Fine Art Finance[165]. This development might be to the advantage of Art owners, as competition intensifies and competencies advance.

However, it must be acknowledged that this approach is very different from the other suggestions presented here, as it does **not target the management of Art** itself but merely utilizes paintings to obtain leverage and by this means enhanced liquidity. As a consequence, the strategy does not require expending additional resources for the development of additional skills and expertise but instead saves or frees up resources. Though, it implies a **change to the basic characteristics of the overall pension portfolio** and **additional obligations** which need to be met. Therefore, especially pension institutions would probably first assess very thoroughly all alternative measures to hedge the illiquidity risk and rather refrain from using paintings as collateral or even investing in Art in the first place. However, for specialized Art investment funds this approach might represent an interesting option to deal with the limited solvability of paintings in the short-term.
Since the functioning of this strategy does not actually build on the specific characteristics of paintings but works rather independently from those, it could generally be **applied to Art of any segment**. Though, since segments are marked by different price ranges and volatility, the amount of the loan granted as well as the loan terms might vary correspondingly.

4.2.4 Conclusion

Table 3 provides an overview of the key-characteristics of each of the possible strategies suggested. It is worth re-emphasizing that those approaches differ in their strategic focus or benefit sought, ranging from cost reduction to value enhancement. Along with this changing focus varies the strategic importance of Art itself and accordingly also the need to distinguish between the characteristics of different Art segments. Concurrently, very different requirements arise concerning the skills and area of expertise calling for increasingly specialised knowledge about the intricacies of the Art world. Most importantly, though, suggested approaches can vary substantially with regard to the profit potential they offer and risk they imply.

[164] Farrel (2008)
[165] Taylor (2008)

Table 3: Overview of strategies for Management of Art

	Economies of Scale	Renting	Market Creation & Development	Art as Collateral
Benefits	• cost reduction	• cost reduction • revenue generation • value enhancement (as possible side-effect)	• value enhancement	• liquidity increase • opportunity cost reduction
Risks		• higher physical risks (coverable by insurance) • over-exposure	• uncontrollable effects • over-exposure	• change of basic portfolio characteristics • additional liabilities
Requirements and Costs	• scale and frequency of transactions (bargaining power)	• skills and expenses related to commercial business of renting • existence of organized rent market and interest from demand-side	• extensive knowledge of and experience with Art market • access to & influence over key-players • costs of promotion activities	
Targeted Art Segment	• all Art segments	• all Art segments (variations possible according to targeted client group)	• Contemporary Art	• all Art segments (possible variations in amount and terms of loans)

Those considerations and conclusions apply not only to the strategies for actual management of paintings but also to the opportunities that arise at the other phases of the Art investment process, namely the stages of portfolio decisions or sale and purchase. It is evident that paintings as a financial instrument might provide over hitherto unexpected and unused potential. However, it has to be clearly recognized the realization of this potential poses often extremely high demands concerning specialised knowledge, investment of resources and therefore costs. The higher the potential return expected on a strategy, the larger are usually those requirements but also the uncertainty of success, thus risk.

It is doubtful whether pension institutions are able and/or willing to embark on those activities and embark on those risks. As it had already been pointed out, whereas some strategies might be easily implemented with the existing skills of pension institutions, others would require a completely different know-how beyond the usual competence area not only difficult or cumbersome but maybe even impossible to develop internally. Especially, being uncertain whether ultimate benefits were able to outweigh costs and compensate sufficiently for the risks taken, conservative institutional investors could still be reluctant to invest in Art.

A worthwhile question, however, would be whether an alternative investment mode, that is indirect investing through specialised funds to which pension institutions shift the tasks of active management to external parties could change this picture. This shall be investigated in the following paragraph.

4.3 Direct and Indirect Investment

As had already been indicated before, if pension institutions desired to invest, hold and administer an Art portfolio directly, they would need to develop the necessary know-how internally, probably with substantial assistance from external professionals at certain stages. Alternatively, they might decide to pursue Art investment in a different mode, namely through an indirect participation in the market through Art investment funds (Appendix XVI elaborates on the most important characteristics and players). Given their specialization, the latter might perform the various activities along the Art investment process more effectively and efficiently and, in particular, be better able to implement the suggested active management strategies. Furthermore, they might also help alleviate some of the other obstacles arising from pension scheme specific conditions and regulatory stipulations (see Table 2). The underlying reasoning why such benefits could be expected shall be shortly explained in the following. However, the potential advantages shall also be critically assessed and thoroughly weighed against possible concerns and costs in order to get a substantiated picture. Overall this shall help assess whether this mode of investing could represent a worthwhile alternative able to alter the rather negative perception of Art as a financial vehicle.

Figure 7: Assessment of Art investment funds as an indirect investment mode for institutional investors

Benefits	Concerns
• **Higher return on Art investment** ⇨ blend of skills & expertise ⇨ specialization on management of Art	• **Soundness of strategy** ⇨ feasibility of strategies ⇨ coherence between strategies and Art portfolio, target markets, channels and skills
• **Broader diversification**	• **Soundness of return expectations** ⇨ return potential of strategies ⇨ operational costs of fund ⇨ direct & indirect costs to investors
• **Reduction of obstacles related to pension portfolios** ⇨ regular income stream ⇨ liquidity ⇨ valuation assistance	• **Principal-agent conflict** ⇨ possible misalignment of interest ⇨ distorted incentive system
Practical Issues	
• **Lack of track-record** and proven success • **Lack of choice** • Knowledge- and cost-intensive **selection, monitoring & controlling** • **Strong competition** from other alternative investment instruments	

Source: Own creation.

4.3.1 Potential Benefits of Indirect Art Investing

4.3.1.1 Potential Benefits: Higher Return on Art Investments

Utilizing Art investment funds would grant pension institutions **access to funds' expertise** and the related relief from the requirement to develop specialized knowledge internally. From the previous discussion of the Art investment process it has become evident that in order to make sensible decisions concerning a portfolio of paintings it is inevitable to possess extensive knowledge and experience with the market. What is more, whereas at certain phases a similar reasoning as with any other financial instrument might be employed, other steps call for a very different skills set and highly specialized insights going beyond the competencies of pension institutions. The latter are of critical importance when it comes to actively pursuing opportunities for improving the financial performance of paintings and are especially required during the phase of managing Art holdings. Specialised investment funds might possess the adequate blend of skills to master such different challenges as they usually employ and thereby join the proficiency of three groups of people[166]:

- professional investment advisors who do not necessarily possess an Art-related background but are well-versed in the administration of funds in general and financial markets
- people who come originally from the commercial Art world, consequently know the market and provide over an extensive network including various key players from artists to galleries and media representatives
- technical specialists whose area of expertise lies in all activities and tasks directly related to paintings (e.g. assessment of authenticity, storage facilities, insurance needs).

This combination of expertise from different areas might be hard to obtain by **institutional investors themselves** because of **problems to attract talent** of especially the second group. Whereas personnel with financial experience is usually at disposal and it might be relatively easy to allure fine art graduates with required technical know-how, the demands and expectations of highly-skilled, respected Art market experts might be more difficult to satisfy. To the latter it might seem more attractive to work for a specialized fund because of factors as a higher status and greater responsibilities conferred to the Art expert or simply more appealing compensation packages. However, having people with a background in the commercial Art world on the investment team is indispensable, as only their experience or intuition might help interpreting market cues and detecting windows of opportunity for favourable transactions. Also, when it comes to strategies as market development it is crucial to exploit their deep ties to the Art world in order to access and establish collaborations with most influential players.

[166] Arnold (2008)

Moreover, with investment funds focusing only on the management of Art holdings they might be better prepared to perform also activities beyond the traditional portfolio management which otherwise would cause **substantial opportunity costs for pension institutions** as the latter always have to consider the most efficient allocation of resources among a variety of assets. Whereas it might be unreasonable to pension institutions, it might appear very sensible to Art investment funds to pursue strategies as renting and to assume in this context also responsibilities of a distinctive commercial business.

4.3.1.2 Potential Benefits: Broader Diversification

In line with commonly cited motives for investing through specialized funds, the potential for greater diversification might also represent a point of attraction for pension institutions. Usually the service of collecting and pooling capital from different investors to achieve larger scale and allow for more diversified positions is of particular appeal to individuals. For institutional investors this feature is normally of lower interest given the large amount of capital under their management and the resulting opportunity to spread risks on their own. However, the situation for investments in Art might be different due to the idiosyncratic characteristics of paintings like the extreme heterogeneity of Art pieces and whole Art segments, the indivisibility of works and wide distribution of prices ranging up to several millions for single paintings. Especially, if pension institutions were willing to invest in paintings with the strategic objective of diversifying their overall portfolio but only wanted to commit a relatively small amount of capital, the cited factors could render it **difficult to achieve with the provided budget a position of minimised unsystematic risk** within and across different Art segments. Assuming, for instance, that pension institutions intended to allocate between 0.1%-0.5% of their assets to Art[167], the possible investment volume of the 11 biggest Danish players could lie in the range of USD9-44 million to USD130-649 million, respectively (see Appendix XVIII). Although it is difficult to give an estimate of the minimum sum required for a reasonable investment in Art, it appears questionable whether institutions at the lower end of the scale would be able to obtain exposure to both a large number of paintings and artists in one segment (especially if OM were considered) as well as to several different segments. This point is highlighted when comparing the budgeted allocation to Art with the investment volume that different types of Art funds are aiming for and which could be regarded as a sort of sensible benchmark for capital requirements. Those fund volumes can vary between

[167] Note: Possible allocation reflect pension experts' judgement (Peter Carøe expressed that an allocation of 0.5% to Art would be the maximum he could imagine for PFA) and the fact that Danish pension institutions allocate on average only around 3% of assets to alternative investment instruments (which renders a larger investment than 0.5% in a novel instrument highly unlikely)

USD40 million for arbitrage pursuing strategies [168], USD100-200 million if activities are concentrated on individual segments [169] and USD350 million if investments in multiple Art categories are targeted (see also Appendix XVI). In view of this, it might seem particularly reasonable for 'smaller' pension institutions to **invest in an already diversified Art fund or to participate alternatively in several focused Art funds** in order to spread risks most effectively. Though, the currently rather limited supply of funds and the multiplication of various cost items arising for indirect investing might represent practical issues for especially the latter approach.

4.3.1.3 Potential Benefits: Reduction of Obstacles Related to Pension Portfolios

Depending on the specific strategies and approaches chosen, respective investment funds could also provide remedy for some of the other obstacles deterring pension institutions from considering Art as an investment vehicle.

For example, the issue of a lack of **regular income** might be mitigated. The Fine Art Fund reportedly strives to provide dividend income to its investors by employing the here presented strategy of renting[170]. It is also conceivable that funds progressively selling works during their lives distribute realized gains in form of dividends. However, it appears that the majority of investment funds does not intend to pay out any interim profits but rather seeks to reinvest possible proceeds in the Art portfolio and maximize in this manner the overall return.

For this reason, many investment funds also stipulate that capital invested is locked for the lifetime of the fund and cannot be withdrawn before the entire fund is liquidated, hence resulting in even **lower liquidity** than if investors held paintings directly. Very similar to the organization of Private Equity funds, there is no opportunity to trade Art shares on secondary markets and generate cash if needed before expiration of the predetermined investment time. An exception is, for example, the Art Trading Fund which is listed as a closed-end company and consequently should allow investors to sell their interests to third parties. Overall, though, the limited redeemability does not need to put the investment through Art funds at a relative disadvantage if fund managers are able to generate higher returns over the fixed investment period which **sufficiently compensate for the illiquidity** - an aspect which could not be satisfied by and therefore presented a major point of criticism concerning direct holdings of Art.

[168] example refers to the Art Trading Fund, see Salmon (2007)
[169] examples refer to the fund of Graham Arader (USD200 million for investments in American paintings, see Adam & Mason, 2005), the China Fund (USD200 million for investments in oriental Art, see Adam & Mason, 2005), the Aurora fund (USD100 million aimed at Russian Art,, see Arnold, 2008) and the fund of Meridian Art Partners (aiming at USD100 million for Art of emerging markets, see Arnold, 2008)
[170] Arnold (2008)

Lastly, the utilization of investment funds might make it easier for pension institutions to **assess and report the market value of their investments in Art**. Although Arnold comments that "regulatory frameworks are analogous to those of hedge funds" [171] and accordingly legal requirements concerning publication of information are quite lax, it is likely that Art investment funds voluntarily agree to provide investors with regular performance reports. Presuming that funds are in the best position to value paintings in general and also have an interest in informing investors genuinely about the current portfolio worth, pension institutions could then simply transfer declared figures to their own financial statements. However, this advantage relies clearly on the premise that specialized funds possess the required ability to determine the value correctly and can be trusted – which might be called into question in view of the nature of valuation difficulties and the potential misalignment of interest between principals and agents (see discussion in Section 4.2.3.3).

4.3.2 Concerns about Indirect Art Investing

4.3.2.1 Concerns: Soundness of strategy

Although it appears plausible that their expertise and specialization enable investment funds to exploit opportunities along the Art investment process, it is in order to challenge the overall **sensibleness and feasibility** of proposed strategies. Thus, it should be thoroughly clarified whether suggested actions make sense, can be implemented and lead to success. Of course, these issues need to be addressed in any due diligence process when institutional investors consider outsourcing the asset management to external service providers, however, might prove to be particularly challenging in the given context.

Usually, common industry practices or track records of individual fund providers serve as valuable reference points in identifying sound and potentially successful strategies. However, in contrast to the situation for Hedge and also Private Equity funds "where there are several thousand funds, numerous studies, multiple benchmarks and extensive media coverage - it is arguably **not realistic to talk of an [A]rt investment fund industry**"[172]. Although substantial interest could already be recognized and various attempts were undertaken to establish funds specialized in paintings, only a few actually succeeded in launching and even fewer are still in existence at the present time. Most importantly, of this limited number of funds **none** can yet provide a **reliable track record** as they are still in the pre-liquidation phase. Likewise, the variety of different organizational forms and

[171] Arnold (2008)
[172] Arnold (2008)

strategic approaches employed by the players renders it **difficult to recognize** any common patterns which might indicate **success factors** and thereby serve as selection criteria for investors.

Though, the observations made in the preceding discussion might at least offer a certain guideline against which to judge the reasonableness and prospects of success. One of the main insights there was that a necessary prerequisite for strategies to work and thrive is the alignment or **coherence between the chosen approaches**, on the one hand, **and the Art portfolio, target markets and channels as well as the fund's resources**, on the other hand. Considering the approaches to actively manage Art, not all appeared equally suitable and effective for any type of paintings. Market creation, for instance, seems only sensible for Art segments with high volatility and easily susceptible demand as in the case of Contemporary works. If, for example, the generation of arbitrage profits were sought funds needed to be present and well-connected to different, dissimilar geographical locations or points of sale in order to be able to identify and exploit inefficiencies. Moreover, each action varies substantially in terms of the requirements for skills, know-how and will only be effective and cost-efficient if a match can be ensured.

4.2.3.2 Concerns: Soundness of return expectations

Even if pursued strategies prove to be sound and consistent with Art funds' portfolios and skills, there is reason to challenge the ultimate gain that investors can expect to make on the overall investment. In particular, it appears necessary to question the size of returns that funds promise to deliver given possible variations in the potential of different strategies or the effect of operational expenses. Furthermore, it is in order to account for various direct and indirect costs that might accrue to the investor when assessing the amount of net receipts remaining in the end. The following explanations shall illustrate these concerns.

Each **strategy** employed to alter the financial performance of paintings has a very different capacity to affect overall profitability: approaches vary in strategic focus, are associated with diverging risk and therefore also characterised by **different up- and down-side potential**. The impact on bottom-line results might be much larger when a fund succeeds in generating additional revenues by creating demand for an artist who is initially unknown, accordingly inexpensive but can be re-sold at a multiple of its acquisition value than when cost savings were realized through economies of scale. The first approach might face virtually no upper limit while the maximum obtainable reduction of expenses is clearly restrained. However, whereas the prospect and extent of success are rather uncertain for the concept of market creation and actions might only be suitable for selected

segments, economies of scale are easier to be realised and appear effective for all types of Art. Such differences in chances of success and scope of applicability need to be accounted for when assessing the sensibleness of targeted returns.

Moreover, **operational costs** that arise typically for the direct holding of paintings and the administration of investment funds as well as additional **expenses related to active management strategies** need to be kept in mind when evaluating the soundness of return expectations. Regardless of their expertise and pool of specialists, funds are still confronted with the expenses due on transportation, storage and maintenance, premia for insurance and even the use of external service providers. Furthermore, provisions need usually also to be made for soliciting and cultivating relationships with investors and other promotional, advertising or administrative activities. Such expenses might be passed on to investors directly in the form of annually payable service fees or indirectly by drawing on the investment capital to cover the mentioned costs. Importantly, all indirect costs reduce immediately the value of assets under management and impact in this manner the overall return that can be generated by the respective investment fund. It will depend on the policies of each specific fund whether and which items exactly will be paid from the funds collected through explicit service fees. It is therefore critical for investors to identify which items are actually 'hidden' and in how far those costs might affect the stated targets for return. The charges and taxes due on transactions, for instance, are not apparent but limit directly the return potential - and this not to an insubstantial degree. Overall, it must also be kept in mind that the size and structure of expenses are mostly intrinsically related to and therefore varying with the strategic approaches chosen by investment funds. Either funds or the investor should make respective allowance when assessing profitability.

Next to verifying the yield that different funds can reasonably achieve, investors also have to provide for costs they might incur directly and which impact the net profit. In particular, this refers to **fees** which become due for the use of professional services of investment funds: on the one hand, the already mentioned annual management fees of usually 2-4% of assets have to be paid[173]; on the other hand, investors need to disburse performance-related compensation which might be based on sales proceeds of individual paintings or the profits generated when the fund is cleared at termination (around 20% of value[174]). However, as it has become evident from the preceding discussion, a very thorough process of due diligence and selection appears in order and subsequently monitoring and control will be necessary, too - tasks which require expending **additional resources for developing necessary know-how and performing investigations**.

[173] Gutner & Capell (2005)
[174] Gutner & Capell (2005)

4.2.3.3 Concerns: Principal-agent relationship and potential for associated conflicts

The environment in which investments in funds and Art take place renders the relationship between fund managers (acting as agents) and investing pension institutions (representing principals) very prone to problems. The Art market idiosyncratic features of high unpredictability and requirement for very specialized knowledge imply uncertainty about outcomes of any actions as well as pronounced information asymmetry between different actors. Such conditions make it **difficult if not impossible to determine whether poor performance** of an investment fund is attributable to adverse external developments or simply the **result of bad management** and insufficient effort from the agents' side. Moreover, the set-up and organization of Art investment funds provide managers often with **incentives not to act in the best interest of the investors**, i.e. the principals, but to pursue merely their own good. Although compensation structures usually arrange for performance-related remuneration and thereby are designed to motivate managers to strive for high value creation, the sheer size of most funds (often with AUM in the range of tens or even hundreds of million dollars) could let the guaranteed annual service fee appear as a very attractive, satisfactory salary[175]. In the worst case, an agent could decide to collect capital from investors, compose a pro-forma portfolio of Art pieces, then sit and wait for the liquidation of the fund without expending any effort to enhance value but merely pocketing regularly the annual service fees. Clearly, without activities seeking to improve the rather weak financial performance of Art and accounting for the fixed costs incurred on the investment through funds, the overall return would most likely fall short of investors' expectations if not result in material losses. Because of the problems to control and evidence (non)performance it would be hard to accuse and hold fund managers responsible for fraud, gross negligence or similar omissions - an evident risk that might deter from investing in Art funds in the first place.

It is essential that pension institutions are completely aware of such possible principal-agent conflicts, that they actively integrate those as a factor in their decision-making process of whether to undertake the investment and, if so, also include it in their selection of possible funds. A careful **assessment of the compensation and incentive system** is crucial and it should be looked for provisions aligning the interests of all parties, for example, a co-investment by fund managers[176]. Once having invested, it becomes important to **monitor and control** investment funds' activities as far as this is possible, not only because of the imminent risk but also because pension institutions are explicitly held responsible by regulations to ensure compliance of any external service provider.

[175] Salmon (2007) comments on the Art Trading Fund: "At $40 million, it doesn't even count as particularly large (…) [s]till, with a management fee of 2%, its principals stand to make at least $800,000 a year, all while soaking up the glamor and flattery of the art world and having their egos massaged by art-world types. It's not a bad way to make a decent living – until the investors get fed up and pull their money out, of course."

[176] Adam & Mason (2005)

As it had already been noted previously, the expenses associated with those monitoring activities should undoubtedly be counted as **indirect costs** which diminish potential benefits of specialized funds. However, the conditions mentioned before might prove it very hard to exercise effective supervision over specialized Art funds and require most certainly that investors provide over very **profound knowledge of the Art market** themselves to be able to assess funds' performance.

4.3.3 Conclusion

Reflecting on the foregoing discussion and assessing the cited benefits as well as concerns, it can be concluded that the use of specialized investment funds bears certain potential to render Art investments more attractive to institutional investors. However, the picture presented is by no means convincing and it has become evident that a great amount of wariness and caution is in order. Especially the positive prospects of higher return, diversification and remedy of pension institution-specific obstacles are subject to significant uncertainty and substantially reliant on the respective strategies and organizational set-up chosen by investment funds. In contrast to that, the drawbacks represented by various direct and indirect costs as well as the principal-agent risk appear more concrete, seem to loom larger and might therefore act as a strong deterrent. The difficulty lies not simply in identifying but also in quantifying both, potential gains and costs. It must be critically assessed whether respective investment funds can deliver ultimately positive results which, above all, are also competitive with the returns obtainable on other financial instruments. This issue is clearly aggravated by the situation of the Art fund 'industry', namely, its non-existence. Being very inexperienced with Art as an asset class in general and Art funds as an investment instrument in particular, the lack of track record or other indications for success renders it very difficult to build confidence in this new form of investment.

The elaborations on the opportunities along the Art investment process as well as the presented analysis of benefits and concerns provides a set of criteria which could be used to thoroughly assess Art funds in due-diligence, selection and monitoring. However, in the absence of suitable candidates to choose from the undertaking is doomed to end in deadlock.

5. CONCLUSIONS

5.1 Conclusions

From the preceding discussion it must be concluded that **Art does not seem to present a new alternative investment opportunity for institutional investors** - at least **when direct holdings and a passive approach are concerned**.

The very nature of Art renders the market for paintings prone to substantial irrationalities, high information scarcity and asymmetry as well as different types of costs. Those idiosyncrasies imply considerable valuation difficulties, high illiquidity and volatility of markets - all aspects which represent sources of uncertainty, thus risk to financial investors. Most importantly, though, the average return delivered by paintings does not compensate sufficiently for those risks and, on the contrary, proves to be negative when it is accounted for the various expenses incurred on the development of expertise, transactions and maintenance. Moreover, applying the specific investment criteria of pension institutions arising from the nature of pension obligations and regulations additional objections can be identified which challenge severely the suitability of Art for pension portfolios. Especially under pension schemes with a liability side, paintings appear to conflict with immunization principles, be a costly source of capital and lead to inconveniences with strict regulations concerning, for instance, reporting. In the presence of a highly sophisticated investment universe, Art fails to convince on critical issues and cannot prevail over more traditional or novel forms of alternative investment as Private Equity, Hedge-Funds, Timber or Infrastructure: paintings do evidently not provide superior financial performance; desirable anti-cyclical behaviour and associated diversification benefits are overshadowed by negative returns and more easily achieved by means of derivate instruments. Furthermore, pension experts indicate that possible accusations of regulatory infringement or other misconduct (e.g. regarding reporting, communication or prudential duties) could lead to substantial reputational damage and loss of business - again, risks for which paintings do not offer commensurate remuneration.

However, it could be demonstrated that taking an **active approach to investing in paintings bears the potential to improve financial performance** and thereby the overall standing as an instrument for institutional investors. Along the different phases of the Art investment process, different opportunities arise to reduce costs, enhance revenues or moderate other obstacles impeding the inclusion in pension portfolios. Though, it was challenged whether it were cost-efficient or even possible for pension institutions to develop the expertise and to expend resources that would be

required for identifying and realizing the aforementioned opportunities on their own. Investing indirectly through specialized Art funds could be a mean to avoid such issues and to better tap the full potential that paintings could unfold under active management - at least in theory. In practice, hardly quantifiable benefits and lack of evidence for success stand opposite to very concrete costs and concerns so that it remains difficult to draw conclusions about the ultimate profitability of investing in Art funds.

Without any further action and attempts to work on the deficiencies of Art investments, paintings prove to be unsuitable instruments for pension institutions and possibly all types of institutional investors. Specialized Art investment funds which strive to take a very active approach and exploit various opportunities could present a remedy to weak financial performance and other concerns about the asset class. However, they still have to prove their capabilities and until then pension institutions are better of choosing other financial vehicles which present themselves in the diverse investment universe, do already meet their investment criteria and deliver sought-after benefits.

5.2 Own Contributions

Having summarised the most important findings of the study at hand, it should be reemphasised how those results fit into the context of and contributed to the existing research in this area.

Previous research sought frequently to clarify the appeal of Art as an asset class and paid in this regard particular attention to examining financial characteristics of importance to investors in contrast to the perspective of Art lovers or collectors. However, it had been widely neglected to distinguish between different investor types or their particular needs which might result in very different perceptions of Art as an investment instrument. Therefore, the present study attempted to **reconcile the general conclusions concerning Art** as an investment instrument with **the specific conditions faced by and related asset preferences of pension institutions**. The financial performance and other idiosyncratic features of paintings have been matched with the investment objectives, portfolio as well as risk management strategies typically pursued by different pension plan types to develop a **more differentiated and refined picture of the attractiveness** of Art.

Moreover, the study at hand did not settle for providing only a comprehensive list of obstacles deterring institutional investors from Art investments but also strove to **assess the opportunities of mediating those barriers and improve the standing of Art**. For this purpose, different phases of

the Art investment process were thoroughly analysed regarding their effect on profitability and thereby **possibilities for active management** pointed out. In this context, also the possible role, respective dis- and advantages of **investing directly as compared to indirectly** were addressed. More concretely, the discussion of active management approaches provided a very practical contribution as it can be used as either a model for direct investment activities or a guideline for the selection and evaluation of specialised Art investment funds.

5.3 Future Research

Doubtlessly, the present study is not exhaustive and leaves much room for deeper as well as continuing research.

Art Market

Future investigations of the general attractiveness of Art as an investment instrument might take a more **refined look at the different segments** of paintings. Although current research distinguishes often between different schools or periods of paintings it is mainly focused on the differences in financial qualities, i.e. return and risk figures. However, most studies neglect to address other dissimilarities between the Art segments which might explain varying performance and give rise to varying development and management opportunities, thus potential as a financial instrument. In the research at hand it was illustrated that the categories of Old Masters and Contemporary paintings are of very different character and follow different rules, thus call also for distinctive strategies when being managed as an investment vehicle. The presented considerations were so far only suggestive and could be elaborated further as well as extended to other segments in the future.

Moreover, it should be followed in how far the **progress of globalization** might impact the conditions on the Art market, too. It has already become apparent that increased activity on and growing wealth in emerging economies affects strongly the global demand and supply of paintings. Thus, it is in order to observe in how far those developments might influence the risk-return profile of Art and thereby alter its attractiveness.

Danish Pension Institutions

Furthermore, two aspects pertaining to the Danish pension sector might develop over the next years, thereby reshape the investment criteria and preferences of pension institutions along with their attitude towards Art. Specifically, a growth and increasing popularity of **unit-linked pension plans** which follow the principles of defined-contribution schemes might result in more relaxed conditions

for the inclusion of paintings in pension portfolios. However, DC plans are currently still relatively new and account only for a small portion of all pension contracts so that it remains to be seen how they will evolve. In particular, it should be followed which form clients' risk and investment preferences will take and how pension institutions handle information requirements.

Secondly, the pension institutions' reaction to the regulatory framework based on a risk-based solvency system and, most importantly, the introduction of **prudent person principles** should be observed. Future research could investigate whether the relaxation of stipulations and especially portfolio restrictions will result in a reorientation from a rather conservative to more innovative investment behaviour. In this context it could then be analysed in how far the opportunity for and potential role of paintings might be affected, too.

Active Management Strategies

Clearly, the subject area dealing with approaches to mediate the currently existing obstacles to Art investments represents a promising field for further research. The study at hand has already suggested a few **strategies to actively manage** and thereby improve the performance of Art, however merely touched on the potential effect of those ideas. Issues regarding their implementation along with a more detailed, critical assessment of their effectiveness or alternative methods should be further elaborated on.

Likewise, a more detailed discussion of **Art investment funds** could be undertaken, including an in-depth analysis of issues as the concrete strategies and value propositions of existing funds, their development over time and track record as well as final impact on the overall performance of Art as financial instruments. Since the indirect investment via specialized funds had been identified as the only viable and possibly attractive mode for pension institutions to participate in Art, it is of crucial importance to scrutinise in how far they are able to live up to expectations and turn Art into profitable investment opportunities.

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APPENDIX

Appendix I: List of interviewees

Name	Company, position	Area of Expertise	Date
Carøe, Peter	PFA Pension, Head of Alternative Investments	Institutional Investment	18.06.2008
Jørgensen, Claus	Pensionskassernes Administration (PKA), Head of Equities	Institutional Investment	19.06.2008
Jørring Gev, Louise	ATP	Institutional Investment	09.07.2008
Lorenzen, Kasper Ahrndt	ATP Livslang Pension, Beta Portfolio Manager	Institutional Investment	10.06.2008
Lund Kvistegård, Michael	Fondsmæglerselskabet af 2004 (FMS04), Analyst	Institutional Investment	12.06.2008 17.06.2008
Weuder, Ulrik Dan	ATP Livslang Pension, Beta Portfolio Manager	Institutional Investment	11.06.2008
Cooper, Charlotte	The Fine Art Fund	Art Investment Fund	28.07.2008
Dilib	Asian's Art Investment Fund	Art Investment Fund	20.07.2008
Eckstein, Jeremy	Meridian Art Partners, Head Investment Strategist	Art Market and Art Investments	24.06.2008
Esterow, Milton	ARTnews, Head Editor and Publisher	Art Management	10.07.2008
Frey, Bruno S.	University of Zurich, Professor	Economics of Art	29.02.2008
Haugard, Niels Bo	Bruun-Rasmusen	Art Valuation	31.07.2008
Isaksen, Jan	Karat Forsikring	Insurance	31.07.2008
Jacobson, Jessy	Bernard Jacobson Gallery	Co-owner and Manager	04.06.2008
Møller, Michael	Copenhagen Business School, Professor and Author	Economics of Art	19.06-2008
Penanster, Bruno de	Art Investment Conference at London Business School	Art Investment	21.05.2008
Talon, Sebastian	G&T Art Investment	Art Investment	18.05.2008
Uldall, Anne Grethe	Statens Museum for Kunst	Art museum	28.08.2008
Weil, David	Artist and Art Fund advisor	Art Market	26.05.2008 04.06.2008

Appendix II: Overview of Art styles

Time	Art Style
1200 – 1500	**Gothic**
1420 – 1600	**Pre-renaissance** (1420 – 1500) **Renaissance** (1500 – 1530) **Post-renaissance** (1530 – 1600) **Mannerism** (1540 – 1600)
1600 – 1750	**Baroque**
1700 – 1800	**Regence** (1710 – 1735) **Rococo** (1715 – 1780) **Classicism** (1770 – 1830)
1800 – 1900	**Realism / Naturalism** (1830 – 1900) **Impressionism** (1860 – 1900) **Symbolism** (1880 – 1900) **Art Nouveau** (1890 – 1900)
1900 – 1950	**Fauvism** (1905 – 1920) **Expressionism**(1905 – 1919) **Cubism** (1907 – 1925) **Futurism** (1909 – 1915) **Bauhaus / Constructivism** (1916 – 1925) **Constructivism** (1913 – 1930) **Dadaism** (1916 – 1925) **Surrealism** (1924 – 1945)
1950 – 1990	**Abstract Expressionism** (1945 – 1960) **Optical Art** (1955 – 1975) **Realism / Aktionsart** (1958 – 1975) **Pop Art** (1958 – 1965) **Photorealism** (1965 – 1975) **Figurative Paintings** (from 1970) **Neo Geo** (1990 – 1995)

Source: adapted from Gonzales (2002)[177]

[177] Gonzáles, T 2000, 'Kunstinvestment: Geschichte-Markstruckture-Preisbildung', in Pues, L, Quadt, E & Rissa (eds) *Art Investors - Handbuch für Kunst und Investment*, Finanzbuch Verlag, München.

Appendix III: Overview of studies on risk-return performance of Art

Author	Focus Area	Period	Price Index Method	Nominal Return	Real Return	Std. Deviation
Agnello & Pierce (1996)	American artists	1971-1992	Hedonic regression	0.0930	0.0325	
Anderson (1974)	Paintings in general	1800-1970	Hedonic regression	0.0330	0.0260	
Baumol (1986)	Paintings in general	1652-1961	Repeat sales regression		0.0055	
Bryan (1985)	Paintings in general	1970-1984	Price basket	0.1070		0.0820
Buelens & Ginsburgh (1993)	Paintings in general	1780-1970	Repeat sales regression	0.0370	0.0300	
Campbell (2004)	Paintings in general	1875-2002	Repeat sales regression	0.0723		0.4228
		1965-2002	Repeat sales regression	0.1094		0.2045
Campbell (2008)	Paintings in general (and OM, Europ Impress, Modern, Cont)	1976-2002	Average prices	0.0572		0.1711
		1976-2002	Repeat sales regression	0.1007		0.2188
		1980-2006	Average prices	0.0656		0.0808
Chanel, Gerard-Varet & Ginsburgh (1995)	Paintings in general	1855-1969	Hedonic regression		0.0490	
		1855-1969	Repeat sales regression		0.0500	
Frey & Pommerehne (1989)	Paintings in general	1635-1949	Repeat sales regression		0.0140	0.0530
		1635-1987	Repeat sales regression		0.0150	0.0500
		1950-1987	Repeat sales regression		0.0160	0.0470
Goetzmann (1993)	Paintings in general	1716-1986	Repeat sales regression	0.0320	0.0200	0.5650
		1850-1986	Repeat sales regression	0.0620	0.0380	0.6500
		1900-1986	Repeat sales regression	0.1750	0.133	0.5280
Higgs & Worthington (2005)	Australian artists	1973-2003	Hedonic regression	0.0696		0.1651
Mei & Moses (2001)	Paintings in general (and American, Impress, OM)	1875-1999	Repeat sales regression		0.049	0.428
		1900-1999	Repeat sales regression		0.0520	0.3550
		1950-1999	Repeat sales regression		0.0820	0.2130
Mei & Moses (2006)	Paintings in general	1954-2004	Repeat sales regression	0.1000		0.1860
Pesando & Shum (1999)	Modern prints	1979-2003	Repeat sales regression		0.0122	13.7400
Pesando (1993)	Modern prints	1977-1992	Repeat sales regression		0.0151	0.1994
Rennboog & Van Houtte (2002)	Belgian artists	1970-1997	Hedonic regression	0.0237		0.1940
		1970-1997	Average prices	0.0864		0.3660
Stein (1977)	Paintings in general	1946-1968	Mean prices	0.1050		
Worthington & Higgs (2004)	Paintings in general (and 8 major Art segments)	1976-2001	Average prices	0.0303		0.1012

Appendix IV: Composition of Danish pension institutions' investments assets, 2006-2007

	Percent	
	2006	2007
Property and buildings, directly owned	3.04%	2.64%
Property shares	5.18%	5.85%
Total Property and Buildings	8.22%	8.49%
Listed Danish equities	5.28%	4.42%
Unlisted Danish equities	1.22%	1.24%
Listed foreign equities	18.52%	19.24%
Unlisted foreign equities	2.26%	3.25%
Total Equities	27.32%	28.15%
Government bonds (zone A)	18.96%	14.01%
Mortgage bonds	25.60%	29.37%
Index-linked bonds	6.36%	5.67%
Credit bonds (investment grade)	3.53%	4.75%
Credit bonds (non-investment grade, including emerging-market bonds)	4.35%	4.89%
other bonds	0.88%	0.83%
Total Bonds	59.68%	59.52%
Asset-backed loans	0.01%	0.01%
Other financial investment assets	2.16%	2.66%
Financial derivative instruments (securing net-changes in asset and liabilities)	1.76%	0.32%

Asset Classes & Allocations for Calculations	
Property	2.64%
REITs	5.85%
Equities	28.15%
Bonds - Treas	14.01%
Bonds - Aggr	45.51%
Hedge Funds	2.99%

Source: adapted from Danish Financial Supervisory Authority, Table 2 (FSA, 2008)[178]

[178] The Danish Financial Supervisory Authority, Finanstylsynet, viewed August 8th, 2008, http://www.finanstilsynet.dk/graphics/finanstilsynet/mediafiles/newdoc/statistik/8/MU2007_LIPE.pdf

Appendix V: Listing of and detailed information on indices

Asset Class → Index	Components
Art **→ Art 100 Index** • Data availability: Jan 1976-Dec 2007 • Price bracket: central 80% prices • Source: www.artmarketreport.com (viewed 25 July 2008) Art Market Research®	Pierre ALECHINSKY, Helen ALLINGHAM, Jean DUBUFFET, Max ERNST, Henri FANTIN-LATOUR, Lyonel FEININGER, Lucio FONTANA, Myles Birket FOSTER, Jean Honore FRAGONARD, Sam FRANCIS, Thomas GAINSBOROUGH, John William GODWARD, Jan van GOYEN, Jean-Baptiste GREUZE, Atkinson GRIMSHAW, Francesco GUARDI, Keith HARING, Henri HARPIGNIES, Childe HASSAM, Paul-Cesar HELLEU, John Frederick (snr) HERRING, Ferdinand HODLER, Antonio JACOBSEN, Johan-Laurents JENSEN, Johan Barthold JONGKIND, Asger JORN, Jan van KESSEL, Ernst Ludwig KIRCHNER, Moise KISLING, Paul KLEE, Gustav KLIMT, Willem KOEKKOEK, Oskar KOKOSCHKA, Willem de KOONING, Nicolas de LARGILLIERE, Carl LARSSON, Marie LAURENCIN, Fernand LEGER, Lord Frederic LEIGHTON, Sir Peter LELY, Bruno LILJEFORS, Nicolaes MAES, Rene MAGRITTE, Michele MARIESCHI, Ben MARSHALL, Henri MATISSE, Sir John Everett MILLAIS, Joan MIRO, Claude MONET, Giorgio MORANDI, Sir Alfred MUNNINGS, Emil NOLDE, A R PENCK, Pablo PICASSO, Serge POLIAKOFF, Pierre Auguste RENOIR, Sir Joshua REYNOLDS, Jean-Paul RIOPELLE, Diego RIVERA, Hubert ROBERT, Dante Gabriel ROSSETTI, Salomon van RUYSDAEL, Gino SEVERINI, Dorothea SHARP, Leon SPILLIAERT, Carl SPITZWEG, Alfred STEVENS, Marcus STONE, Abraham STORCK, Antonio TAPIES, David (younger) TENIERS, Fritz THAULOW, Archibald THORBURN, Giovanni Battista TIEPOLO, James Jacques Joseph TISSOT, Maurice UTRILLO, Louis VALTAT, Edouard VUILLARD, Andy WARHOL, Tom WESSELMANN, Jack Butler YEATS, Anders ZORN, Sir Lawrence ALMA-TADEMA, Michael ANCHER, Karel APPEL, Georg BASELITZ, Jean Michel BASQUIAT, Albert BIERSTADT, Pierre BONNARD, Fernando BOTERO, Francois BOUCHER, Eugene BOUDIN, Arthur Merric Bloomfield BOYD, Georges BRAQUE, Bernard BUFFET, Sir Edward Coley BURNE-JONES, CANALETTO, Marc CHAGALL, Sandro CHIA, Giorgio de CHIRICO, Pieter CLAESZ, Jean Baptiste Camille COROT, Gustave COURBET, Salvador DALI, Montague DAWSON, Otto DIX
Old Masters (OM) **→ Old Masters 100 Index** • Data availability: Jan 1976-Dec 2007 • Price bracket: central 80% prices • Source: www.artmarketreport.com (viewed 25 July 2008) Art Market Research®	Osias I BEERT, Nicolaes BERCHEM, Louis Leopold BOILLY, Francois BOUCHER, Jan (elder) BRUEGHEL, Jan (younger) BRUEGHEL, CANALETTO, Annibale CARRACCI, John CONSTABLE, Aelbert CUYP, Arthur DEVIS, Carlo DOLCI, Sir Anthony van DYCK, Jean Honore FRAGONARD, Frans I FRANCKEN, Thomas GAINSBOROUGH, Theodore GERICAULT, Luca GIORDANO, Jan van GOYEN, Jean-Baptiste GREUZE, Francesco GUARDI, Giacomo GUARDI, Giovanni Francesco GUERCINO, Jan Davidsz de HEEM, Egbert van HEEMSKERK, Meindert HOBBEMA, William HOGARTH, Melchior de HONDECOETER, Jean Baptiste HUET, Jacob van HULSDONCK, Jan van HUYSUM, Julius Caesar IBBETSON, Antonio JOLI, Jacob JORDAENS, Jan van I KESSEL, Nicolas LANCRET, Nicolas de LARGILLIERE, Sir Thomas LAWRENCE, Sir Peter LELY, Carle van LOO, Nicolaes MAES, Alessandro MAGNASCO, Michele MARIESCHI, Ben MARSHALL, Adam Frans van der MEULEN, Jan Miense MOLENAER, Klaes MOLENAER, Joos de MOMPER, Peter MONAMY, Jean Baptiste MONNOYER, George MORLAND, Alexander NASMYTH, Charles-Joseph NATOIRE, Jean Marc NATTIER, Aert van der NEER, Adriaen van OSTADE, Isaac van OSTADE, Jean Baptiste OUDRY, Giovanni Paolo PANINI, Jean Baptiste PATER, Giambattista PIAZZETTA, Giovan Battista PIRANESI, Guido RENI, Sir Joshua REYNOLDS, Marco RICCI, Sebastiano RICCI, Hubert ROBERT, George ROMNEY, Salvator ROSA, Thomas ROWLANDSON, Sir Peter Paul RUBENS, Jacob van RUYSDAEL, Salomon van RUYSDAEL, Paul SANDBY, Francis (elder) SARTORIUS, John Nott SARTORIUS, Jan STEEN, George STUBBS, Giovanni Battista TIEPOLO, Giovanni Domenico TIEPOLO, Jacopo TINTORETTO, Joseph Mallord William TURNER, Lucas van UDEN, Willem van de (elder) VELDE, Simon VERELST, Nicolas van VERENDAEL, Joseph VERNET, Paolo VERONESE, David VINCKEBOONS, Simon de VLIEGER, Sebastian VRANCX, Jean Antoine WATTEAU, Jan WEENIX, Adam WILLAERTS, John WOOTTON, Philips WOUWERMAN, Joseph WRIGHT OF DERBY, Jan WYNANTS, Johann ZOFFANY, Francesco ZUCCARELLI
Modern Art (Modern) **→ Modern Art 100 Index** • Data availability: Jan 1976-Dec 2007 • Price bracket: central 80% prices • Source: www.artmarketreport.com (viewed 25 July 2008) Art Market Research®	Pierre ALECHINSKY, Karel APPEL, Fernando BOTERO, Louise BOURGEOIS, Alberto BURRI, Reg BUTLER, Alexander CALDER, Giuseppe CAPOGROSSI, Anthony CARO, Baldaccini CESAR, Lynn CHADWICK, John CHAMBERLAIN, Eduardo CHILLIDA, CHRISTO, CORNEILLE, Joseph CORNELL, Pierre D3 ALECHINSKY, Karel D3 APPEL, Fernandez D3 ARMAN, Edouard D3 ARROYO, Willi D3 BAUMEISTER, Max D3 BECKMANN, Joseph D3 BEUYS, Max D3 BILL, Fernando D3 BOTERO, Louise D3 BOURGEOIS, Alberto D3 BURRI, Reg D3 BUTLER, Alexander D3 CALDER, Giuseppe D3 CAPOGROSSI, Anthony D3 CARO, Baldaccini D3 CESAR, Lynn D3 CHADWICK, John D3 CHAMBERLAIN, Eduardo D3 CHILLIDA, D3 CHRISTO, D3 CORNEILLE, Joseph D3 CORNELL, Jim D3 DINE, Piero D3 DORAZIO, Jean D3 DUBUFFET, Jean D3 FAUTRIER, Lucio D3 FONTANA, Alberto D3 GIACOMETTI, Arshile D3 GORKY, Adolph D3 GOTTLIEB, Hans D3 HARTUNG, Dame Barbara D3 HEPWORTH, Eva D3 HESSE, Friedrich D3 HUNDERTWASSER, Robert D3 INDIANA, Asger D3 JORN, Yves D3 KLEIN, Willem de D3 KOONING, Wilfredo D3 LAM, Roy D3 LICHTENSTEIN, Richard D3 LINDNER, Richard D3 LONG, Piero D3 MANZONI, Giacomo D3 MANZU, Marino D3 MARINI, Agnes D3 MARTIN, Georges D3 MATHIEU, D3 MATTA, Henry O M D3 MOORE, Louise D3 NEVELSON, Ben D3 NICHOLSON, Isamu D3 NOGUCHI, Victor D3 PASMORE, Serge D3 POLIAKOFF, Jackson D3 POLLOCK, Arnaldo D3 POMODORO, Arnulf D3 RAINER, Martial D3 RAYSSE, Germaine D3 RICHIER, Jean-Paul D3 RIOPELLE, James D3 ROSENQUIST, David D3 SIQUEIROS, Daniel D3 SPOERRI, Rufino D3 TAMAYO, Antonio D3 TAPIES, Mark D3 TOBEY, Gunther D3 UECKER, Emilio D3 VEDOVA, Andy D3 WARHOL, Tom D3 WESSELMANN, Richard DIEBENKORN, Jim DINE, Piero DORAZIO, Jean DUBUFFET, Jean FAUTRIER, Lucio FONTANA, Sam FRANCIS, Helen FRANKENTHALER, Alberto GIACOMETTI, Arshile GORKY, Adolph GOTTLIEB, Philip GUSTON, Hans HARTUNG, Al HELD, Dame Barbara HEPWORTH, Patrick HERON, Eva HESSE, David HOCKNEY, DAVID HOCKNEY**, Hans HOFMANN, Friedrich HUNDERTWASSER, Robert INDIANA, Asger JORN, Wassily KANDINSKY, Paul KLEE, Yves KLEIN, Franz KLINE, Willem de KOONING, Wilfredo LAM, Ernst Wilhelm NAY, Louise NEVELSON, Ben NICHOLSON, Isamu NOGUCHI, Jules OLITSKI, Victor PASMORE, Serge POLIAKOFF, Jackson POLLOCK, Arnaldo POMODORO, Arnulf RAINER, ARNULF RAINER**, Martial RAYSSE, Ad REINHARDT, Germaine RICHIER, Bridget RILEY, Jean-Paul RIOPELLE, Diego RIVERA, James ROSENQUIST, Mark ROTHKO, David SIQUEIROS, Pierre SOULAGES, Daniel SPOERRI, Nicolas de STAEL, Rufino TAMAYO, Antonio TAPIES, Wayne THIEBAUD, Mark TOBEY, Gunther UECKER, Emilio VEDOVA, Bram van VELDE, Maria Elena VIEIRA DA SILVA, Andy WARHOL, Tom WESSELMANN, Fernandez ARMAN, Edouard ARROYO, Frank AUERBACH, Francis BACON, Willi BAUMEISTER, William BAZIOTES, Max BECKMANN, Peter LANYON, Roy LICHTENSTEIN, Richard LINDNER, Richard LONG, Morris LOUIS, Piero MANZONI, Giacomo MANZU, Marino MARINI, Agnes MARTIN, Georges MATHIEU, MATTA, Joan MITCHELL, Henry O M MOORE, Robert MOTHERWELL, Joseph BEUYS, Max BILL, Jules BISSIER
Contemporary Art (Contemp) **→ Contemporary 100 Index** • Data availability: Jan 1985-Dec 2007 • Price bracket: central 80% prices • Source: www.artmarketreport.com (viewed 25 July 2008) Art Market Research®	Jasper JOHNS, Donald JUDD, Christian BOLTANSKI, CHRISTIAN BOLTANSKI**, Maurizo CATTELAN, Sandro CHIA, Francesco CLEMENTE, Tony CRAGG, Enzo CUCCHI, Carl D3 ANDRE, Richard D3 ARTSCHWAGER, Miguel D3 BARCELO, Matthew D3 BARNEY, Jean Michel D3 BASQUIAT, Christian D3 BOLTANSKI, Maurizo D3 CATTELAN, Sandro D3 CHIA, Francesco D3 CLEMENTE, Tony D3 CRAGG, Enzo D3 CUCCHI, Wim D3 DELVOYE, Tracey D3 EMIN, Rainer D3 FETTING, Eric D3 FISCHL, Peter and WEISS, David D3 FISCHLI, Dan D3 FLAVIN, Gunther D3 FORG, D3 GILBERT and GEORGE, Robert D3 GOBER, Felix D3 GONZALEZ-TORRES, Douglas D3 GORDON, Dan D3 GRAHAM, Keith D3 HARING, Mona D3 HATOUM, Damien D3 HIRST, Jenny D3 HOLZER, Jorg D3 IMMENDORF, Jasper D3 JOHNS, Donald D3 JUDD, Alex D3 KATZ, Mike D3 KELLEY, Ellsworth D3 KELLY, Anselm D3 KIEFER, Martin D3 KIPPENBERGER, Jeff D3 KOONS, Jannis D3 KOUNELLIS, Sol D3 LEWITT, Robert D3 LONGO, Mario D3 MERZ, Juan D3 MUNOZ, Bruce D3 NAUMAN, Claes D3 OLDENBURG, Gabriel D3 OROZCO, Nam June D3 PAIK, Mimmo D3 PALADINO, D3 PANAMERENKO, A R D3 PENCK, Michelangelo D3 PISTOLETTO, Sigmar D3 POLKE, Richard D3 PRINCE, Robert D3 RAUSCHENBERG, Charles -American D3 RAY, Gerhard D3 RICHTER, Pipilotti D3 RIST, Mimmo D3 ROTELLA, Edward D3 RUSCHA, Niki de D3 SAINT-PHALLE, David D3 SALLE, Julian D3 SCHNABEL, Thomas D3 SCHUTTE, Sean D3 SCULLY, George D3 SEGAL, Richard -American D3 SERRA, Joel D3 SHAPIRO, Cindy D3 SHERMAN, Frank D3 STELLA, Donald D3 SULTAN, Rosemarie D3 TROCKEL, Cy D3 TWOMBLY, Jeff D3 WALL, Franz D3 WEST, Olivier DEBRE, Wim DELVOYE, THOMAS DEMAND**, RINEKE DIJKSTRA**, Peter DOIG, STAN DOUGLAS**, Marlene DUMAS, Tracey EMIN, Luis FEITO, Rainer FETTING, Eric FISCHL, P.& WEISS FISCHLI**, Dan FLAVIN, Gunther FORG, GUNTHER FORG**, Lucian FREUD, GILBERT & GEORGE**, GILBERT and GEORGE, Robert GOBER, NAN GOLDIN**, Felix GONZALEZ-TORRES, Douglas GORDON, DAN GRAHAM**, Andreas GURSKY, ANDREAS GURSKY**, Keith HARING, Damien HIRST, DAMIEN HIRST**, Jenny HOLZER, Gary HUME, Jorg IMMENDORF, Mario MERZ, Juan MUNOZ, Bruce NAUMAN, Shirin NESHAT, SHIRIN NESHAT**, Chris OFILI, Claes OLDENBURG, Gabriel OROZCO, GABRIEL OROZCO**, Nam June PAIK, Mimmo PALADINO, PANAMERENKO, A R PENCK, Michelangelo PISTOLETTO, Sigmar POLKE, SIGMAR POLKE**, Richard PRINCE, RICHARD PRINCE**, Robert RAUSCHENBERG, ROBERT RAUSCHENBERG**, Charles -American RAY, CHARLES RAY**, Gerhard RICHTER, GERHARD RICHTER**, PIPILOTTI RIST**, Mimmo ROTELLA, Susan ROTHENBERG, Thomas RUFF, THOMAS RUFF**, Edward RUSCHA, EDWARD RUSCHA**, Niki de SAINT-PHALLE, David SALLE, Antonio SAURA, Jenny SAVILLE, Julian SCHNABEL, Thomas SCHUTTE, Sean SCULLY, George SEGAL, Richard -American SERRA, Andres SERRANO, ANDRES SERRANO**, Joel SHAPIRO, Cindy SHERMAN, CINDY SHERMAN**, Jose Maria SICILIA, Frank STELLA, THOMAS STRUTH**, Donald SULTAN, Rosemarie TROCKEL, Luc TUYMANS, Cy TWOMBLY, JEFF WALL**, Franz WEST, Christopher WOOL, Alex KATZ, Mike KELLEY, Ellsworth KELLY, Anselm KIEFER, ANSELM KIEFER**, Martin KIPPENBERGER, Jeff KOONS, Jannis KOUNELLIS, Sol LEWITT, Robert LONGO, Sarah LUCAS, SARAH LUCAS**, Robert MANGOLD, Brice MARDEN, Carl ANDRE, Richard ARTSCHWAGER, Miguel BARCELO, Matthew BARNEY, MATTHEW BARNEY**, Georg BASELITZ, Jean Michel BASQUIAT, Vanesa BEECROFT, VANESSA BEECROFT**, Ross BLECKNER

Appendix IV: Listing of and detailed information on indices (continued)

Asset Class → Index	Components
Equities **→ Morgan Stanley Capital Indices (MSCI) World Index** • Data availability: Jan 1976-Dec 2007 • Index Level: total return, gross dividend • Source: www.mscibarra.com (viewed 25 July 2008)	• measures equity market performance of developed markets • includes 23 develop market country indices, free float-adjusted and weighted at market cap
Aggregate Bonds (Bonds – Aggr) **→ Lehman Brothers Global Aggregate Index** • Data availability: Jan 1990-Dec 2007 • Source: Datastream (viewed 1 August 2008)	• broad-based measure of global investment-grade fixed-rate debt markets • includes U.S., Pan-European & Asian-Pacific Aggregate Index as 3 major components (accounting for 94.4% of overall market value) and in addition Global Treasury, Euro-Dollar, Euro-Yen, Canadian and Investment-Grade 144A securities
Government Bonds (Bonds - Treas) **→ Lehman Brothers Global Treasury Index** • Data availability: Jan 1987-Dec 2007 • Source: Datastream (viewed 1 August 2008)	• Treasury sector of the Global Aggregate Index • tracks fixed-rate local currency sovereign debt of investment-grade countries • includes issues from 33 countries denominated in 23 currencies
Property **→ Standard&Poor's/Citigroup World Property Index** • Data availability: Jan 1990-Dec 2007 • Index level: total return, gross cash dividend • Source: www.globalindices.standardandpoors.com (viewed 31 July 2008)	• developed markets component of the S&P/Citigroup Global Property Index which measures the investable universe of publicly traded property companies • measures performance of >450 property stocks from 24 countries (as of December 2007), weighted at market cap
REITs **→ Standard&Poor's/ Citigroup World REIT Index** • Data availability: Jan 1990-Dec 2007 • Index level: total return, gross cash dividend • Source: www.globalindices.standardandpoors.com (viewed 31 July 2008)	• developed market component of the S&P/Citigroup Global REIT Index • measures performance of >275 REITs in 13 developed markets (as of December 2007), weighted at market cap
Hedge Funds **→ Credit Suisse/Tremont All-Hedge Fund Index** • Data availability: Jan 1994-Dec 2007 • Index level: NAV • Source: www.hedgeindex.com (viewed 25 July 2008)	• diversified investable index derived from the Credit Suisse/Tremont Hedge Fund Index (.Broad Index.) • includes the 10 Sector Invest Indices, weighted according to the Broad Index weights after each rebalance. • encompasses 138 hedge funds (as of June 2008)
Inflation **→ OECD Inflation Data** • Data availability: Jan 1976-Dec 2007 • Source: OECD.stat (viewed 26 August 2008)	• percentage change in consumer price index (CPI), based on: consumer prices on all items CPI in all OECD countries

Appendix VI: Details on calculation of financial performance characteristics

General Comments on Calculations	
Currency	• all calculations are based on data is retrieved in US Dollars ($)
Data Interval	• all calculations are based on monthly data; data points reflect the index values on the last day of each month
Calculations: Risk and Return	
Average Annual Return	• average of the arithmetic annual returns • annual returns are arithmetic returns over a 12-month or 1 year holding period; the annual return realized in month t is calculated according to the formula: $r_{annual} = \frac{Index_{sale,\ month\ t} - Index_{purchase,\ month\ t-12}}{Index_{purchase,\ month\ t-12}}$ Note: It is assumed that a specific index is bought and sold entirely at respective points in time.
Gross Nominal Return	• average return based on monthly index data, calculated according to the formula: $r_{gross} = \frac{Index_{sale} - Index_{purchase}}{Index_{purchase}}$
Gross Real Return	• gross nominal returns adjusted for inflation • the inflation rate i employed corresponds to the month at which the nominal return is realized, i.e. the assumed time of sale • nominal rates are converted to real rates of return according to the formula: $r_{real,\ month\ t} = \frac{(1+r_{nominal,\ month\ t})}{(1+i_{month\ t})} - 1$
Net Nominal Return	• gross nominal returns adjusted for transaction costs incurred on the purchase and sale, respectively, of the index concerned • the transaction costs incurred on buy and sale increase the purchase price of the index and decrease the sales- return, respective; the arithmetic return is therefore calculated according to the formula: $r_{net} = \frac{[Index_{sale} * (1 - transaction\ charge_{sale})] - [Index_{purchase} * (1 + transaction\ charge_{purchase})]}{[Index_{purchase} * (1 + transaction\ charge_{purchase})]}$ • the transaction costs for the respective asset classes are listed in Appendix VII Note: Hedge Funds have been excluded from the analysis of net returns; there are generally agreed-upon values for operational costs as management and performance fees for funds, however, no reasonable assumptions can be made about the size of transaction costs.
Standard Deviation	• standard deviations for the respective returns are calculated according to the following formula: $\sigma = \sqrt{\frac{\sum_{t=1}^{N} return_{month\ t}}{N-1}}$ • the divisor is chosen as N-1 to reflect that calculations are based on historical data
Risk-adjusted Return	• return-to-risk ratio, according to the formula: $\text{risk-adjusted return} = \frac{\text{average return}}{\text{standard deviation}} = \frac{\mu}{\sigma}$
Calculations: Holding Period Returns	
Average Annual Real Return over Holding Period x	• average annual gross return over a holding period of x months adjusted for inflation • the inflation rate i employed corresponds to the month at which the nominal return is realized, i.e. the assumed time of sale • nominal holding period returns are converted to real rates of return according to the formula: $return_{holding\ period\ x\ months,\ real} = \frac{(1+return_{holding\ period\ x\ months,\ nominal})}{(1+i)} - 1$ where $return_{holding\ period\ x\ months,\ nominal} = \left(\frac{(Index_{sale,\ month\ t})}{(Index_{purchase,\ month\ t-x})} \right)^{\frac{1}{(t-x)*12}}$ Note: Only returns with holding periods exceeding 12-months or 1 year are calculated as arithmetic averages based on compound annual growth rates (CAGR) over the investment horizon under investigation. Annual returns over a 12-month or 1-year holding period are calculated as simple arithmetic averages, as previously described.

Appendix V: Details on calculation of financial performance characteristics (continued)

Calculations: Efficient Portfolios	
Data	• calculations of returns, standard deviations and the covariance matrix are based on average annual *gross nominal* returns • expectations of return levels, standard deviations and correlations were based on historical values over the period 1994-2007 to allow Hedge Funds to be included
Assumptions	• full investment is assumed, i.e. allocation to all asset classes must sum to 100% • no short selling, i.e. not 'negative' investment in any of the assets is allowed (realistic case to consider for pension fund managers) • no risk-less borrowing and lending
Calculations	• Markovitz-efficient portfolios were calculated by determining the respective asset weights X_i which minimize the overall portfolio variance at a given target portfolio return $\overline{r_p} = \sum_{i=1}^{N} (X_i \bar{r})$ therefore: $\text{Min} \sum_{i=1}^{N} (X_i^2 \sigma_i^2) + \sum_{i=1}^{N} \sum_{\substack{j=1 \\ i \neq 1}}^{N} (X_i X_j \sigma_{ij})$ subject to $\sum_{i=1}^{N} X_i$ (full investment) and $X_i \geq 0$ (no short selling) • efficient frontier is obtained by calculating the respective minimum variance portfolio for different target return varying between values of 2.0-6.5%

Appendix VII: Assumptions about transaction costs

Transaction Costs	
Art	• assumed transaction fee on hammer price of Art for calculations: **→ buying premium of 20.0%** **→ sales premium of 10.0%**
Equities	• transaction costs on Equities can vary contingent on type of stock (e.g. national, foreign), transaction volume and sales outlet utilized • transaction fee on stock value assumed for calculations: **→ buying charge of 0.5%** **→ sales charge of 0.5%**
Bonds	• transaction costs on Bonds can vary contingent on type of bond (e.g. national, foreign, premium), transaction volume and sales outlet utilized • transaction fee on bond value assumed for calculations: **→ buying charge of 1.0%** **→ sales charge of 1.0%**
Property	• transaction costs on Property can vary between 5.2%-13.5% for different European countries, are usually paid by the buyer and typically include[179]: registration costs RE agent and legal fees sales, transfer and additional taxes on new properties • transaction fee on property value assumed for calculations: **→ round-trip costs of 10.5%** (applied as a factor (1-charge) to overall return)
REITs	• transaction costs on REITs typically amount to >2.0%[180] and include commissions bid-ask spreads of 0.7-1.2%[181] • transaction fee on transaction value assumed for calculations: **→ buying charge of 2.0%** **→ sales charge of 2.0%**
Hedge Funds	• costs associated with Hedge Funds typically include: operational costs as annual management fees (1.0-2.0%) performance fees contingent on certain 'water-mark' level (~20.0%) • not possible to assume transaction costs comparable to charges on other asset classes
Note: To simplify calculations it is assumed that all charges for transaction costs are or have been **constant over time**.	

[179] Cruz, PC 2007, 'Housing transaction costs in Europe', *Global Property Guide: The investor's guide to residential property buying abroad*, viewed 11 August 2008, http://www.globalpropertyguide.com/investment-analysis/Housing-transaction-costs-in-Europe

[180] Nelling, E & Gyourko, J 1998, ' The Predictability of Equity REIT Returns', *Journal of Real Estate Research*, No. 16, pp. 251-268.

[181] McDonald, CG, Nixon, TD & Slawson, VC 2000, 'The Changing Asymmetric Information Component of REIT Spreads: A Study of Anticipated Announcements', *Journal of Real Estate Finance and Economics*, Vol. 20, No. 2, pp. 195-210.

Appendix VIII: Financial performance of Art - Risk & return (1990-2007 & 1994-2007)

***Gross Nominal* Returns**

1990-2007	Art	OM	Modern	Cont	Art	Equities	Bonds - Aggr	Bonds - Treas	Property	REITs	Hedge Funds
Avg. annual return	2.51%	2.53%	2.71%	4.29%	2.51%	10.40%	0.30%	0.31%	12.69%	13.98%	
Annual std. deviation	19.70%	13.87%	17.76%	23.74%	19.70%	14.41%	3.81%	3.90%	19.19%	13.33%	
Risk-adjusted return	0.1273	0.1826	0.1529	0.1807	0.1273	0.7215	0.0782	0.0788	0.6614	1.0490	

1994-2007	Art	OM	Modern	Cont	Art	Equities	Bonds - Aggr	Bonds - Treas	Property	REITs	Hedge Funds
Avg. annual return	8.44%	7.52%	8.70%	10.28%	8.44%	10.69%	0.00%	-0.02%	13.05%	15.64%	12.33%
Annual std. deviation	15.18%	11.28%	13.57%	23.79%	15.18%	15.61%	3.36%	3.44%	17.79%	14.01%	9.02%
Risk-adjusted return	0.5561	0.6669	0.6411	0.4323	0.5561	0.6851	0.0005	-0.0056	0.7336	1.1164	1.3677

***Nominal Net* Returns**

1990-2007	Art	OM	Modern	Cont	Art	Equities	Bonds - Aggr	Bonds - Treas	Property	REITs	Hedge Funds
Avg. annual return	-23.12%	-23.10%	-22.96%	-21.78%	-23.12%	1.69%	-1.69%	-1.68%	10.81%	9.51%	
Annual std. deviation	14.78%	10.40%	13.32%	17.81%	14.78%	17.58%	3.73%	3.82%	18.02%	12.80%	
Risk-adjusted return	-1.5645	-2.2207	-1.7239	-1.2234	-1.5645	0.0963	-0.4526	-0.4397	0.6001	0.7427	

1994-2007	Art	OM	Modern	Cont	Art	Equities	Bonds - Aggr	Bonds - Treas	Property	REITs	Hedge Funds*
Avg. annual return	-18.67%	-19.36%	-18.47%	-17.29%	-18.67%	7.62%	-1.98%	-2.00%	11.19%	11.10%	-
Annual std. deviation	11.39%	8.46%	10.18%	17.84%	11.39%	13.44%	3.29%	3.37%	16.82%	13.46%	-
Risk-adjusted return	-1.6394	-2.2877	-1.8146	-0.9689	-1.6394	0.5671	-0.6015	-0.5928	0.6651	0.8250	-

*net return on Hedge Funds has not been calculated as no reasonable assumptions about transaction costs could be made

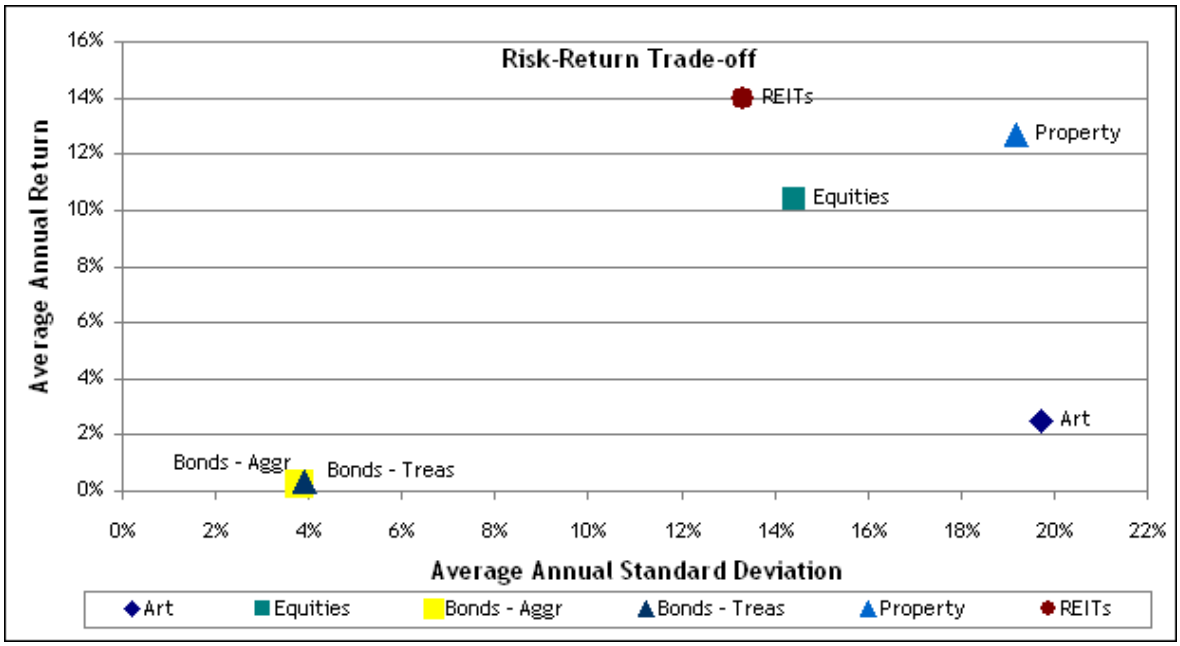
***Real Gross* Returns**

1990-2007	Art	OM	Modern	Cont	Art	Equities	Bonds - Aggr	Bonds - Treas	Property	REITs	Hedge Funds
Avg. annual return	-1.35%	-1.40%	-1.16%	0.37%	-1.35%	6.11%	-3.62%	-3.61%	8.40%	9.62%	
Annual std. deviation	19.61%	13.73%	17.80%	23.44%	19.61%	14.04%	3.51%	3.58%	19.06%	13.57%	
Risk-adjusted return	-0.0686	-0.1022	-0.0651	0.0156	-0.0686	0.4352	-1.0302	-1.0080	0.4409	0.7090	

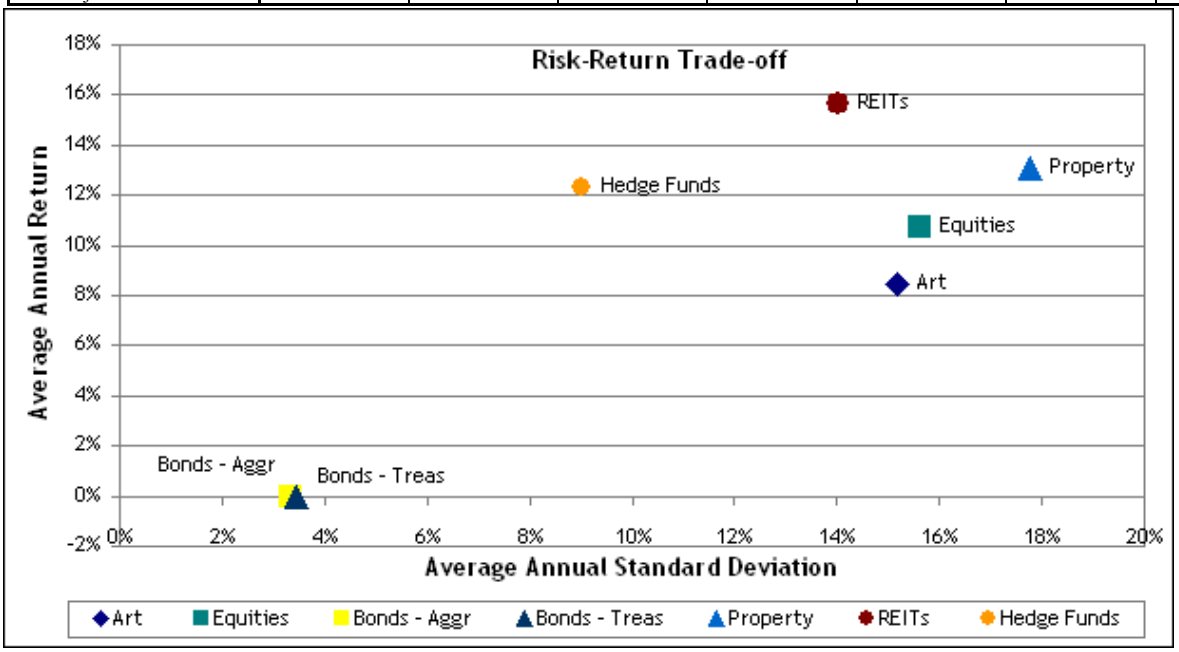
1994-2007	Art	OM	Modern	Cont	Art	Equities	Bonds - Aggr	Bonds - Treas	Property	REITs	Hedge Funds
Avg. annual return	4.69%	3.73%	4.95%	6.49%	4.69%	6.80%	-3.52%	-3.54%	9.16%	11.64%	8.35%
Annual std. deviation	15.17%	10.82%	13.73%	23.30%	15.17%	15.13%	3.13%	3.17%	17.79%	14.12%	8.25%
Risk-adjusted return	0.3093	0.3449	0.3605	0.2785	0.3093	0.4496	-1.1246	-1.1185	0.5150	0.8242	1.0126

Appendix IX: Risk-return trade-off for different asset classes

1990-2007	Art	Equities	Bonds - Aggr	Bonds - Treas	Property	REITs
Avg. annual return	2.51%	10.40%	0.30%	0.31%	12.69%	13.98%
Annual std. deviation	19.70%	14.41%	3.81%	3.90%	19.19%	13.33%
Risk-adjusted return	0.1273	0.7215	0.0782	0.0788	0.6614	1.0490



1994-2007	Art	Equities	Bonds - Aggr	Bonds - Treas	Property	REITs	Hedge Funds
Avg. annual return	8.44%	10.69%	0.00%	-0.02%	13.05%	15.64%	12.33%
Annual std. deviation	15.18%	15.61%	3.36%	3.44%	17.79%	14.01%	9.02%
Risk-adjusted return	0.5561	0.6851	0.0005	-0.0056	0.7336	1.1164	1.3677



Source: Own creation (based on average annual nominal gross returns and standard deviations over the periods 1990-2007 and 1994-2007, respectively).

Appendix X: Annual real returns for different investment horizons (1976-2007 & 1985-2007)

Gross **Nominal Holding-Period Returns (Data period 1976-2007)**

	12-month holding			24-month holding			36-month holding			48-month holding			60-month holding			120-month holding			180-month holding			240-month holding		
	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ
Art	9.88%	22.82%	0.4329	9.14%	19.06%	0.4797	8.73%	16.81%	0.5193	8.27%	14.93%	0.5539	7.77%	12.77%	0.6087	7.20%	7.25%	0.9936	5.76%	4.31%	1.3371	6.76%	0.86%	7.8298
OM	7.97%	17.30%	0.4608	7.59%	13.99%	0.5424	7.21%	12.35%	0.5836	6.78%	10.80%	0.6276	6.43%	9.40%	0.6842	6.66%	4.90%	1.3601	5.58%	3.61%	1.5459	6.35%	1.18%	5.3686
Modern	9.91%	20.97%	0.4726	9.26%	16.66%	0.5561	8.82%	14.35%	0.6145	8.53%	13.03%	0.6544	8.34%	11.54%	0.7222	7.49%	7.99%	0.9374	6.27%	4.57%	1.3707	7.02%	0.82%	8.5338
Equities	13.38%	16.57%	0.8076	12.91%	12.50%	1.0331	12.66%	10.68%	1.1849	12.47%	9.46%	1.3175	12.19%	8.30%	1.4677	12.89%	4.44%	2.9059	12.38%	3.61%	3.4284	12.66%	2.18%	5.8098

μ = average annual return; σ = annual standard deviation; μ/σ = risk-adjusted return

Net **Nominal Holding-Period Returns (Data period 1976-2007)**

	12-month holding			24-month holding			36-month holding			48-month holding			60-month holding			120-month holding			180-month holding			240-month holding		
	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ
Art	-17.59%	17.12%	-1.0278	-5.48%	16.50%	-0.3321	-1.22%	15.27%	-0.0796	0.75%	13.89%	0.0542	1.75%	12.06%	0.1450	4.16%	7.05%	0.5911	3.75%	4.23%	0.8878	5.24%	0.85%	6.1529
OM	-19.02%	12.97%	-1.4661	-6.83%	12.11%	-0.5637	-2.60%	11.22%	-0.2316	-0.63%	10.05%	-0.0626	0.48%	8.87%	0.0541	3.63%	4.76%	0.7640	3.57%	3.54%	1.0091	4.83%	1.17%	4.1443
Modern	-17.57%	15.73%	-1.1168	-5.38%	14.43%	-0.3727	-1.13%	13.04%	-0.0867	1.00%	12.13%	0.0822	2.28%	10.90%	0.2092	4.45%	7.77%	0.5724	4.25%	4.49%	0.9472	5.50%	0.81%	6.7738
Equities	8.82%	20.76%	0.4247	12.35%	12.44%	0.9930	12.29%	10.65%	1.1537	12.19%	9.44%	1.2911	11.96%	8.29%	1.4436	12.78%	4.43%	2.8833	12.31%	3.61%	3.4099	12.60%	2.18%	5.7868

μ = average annual return; σ = annual standard deviation; μ/σ = risk-adjusted return

Gross **Nominal Holding-Period Returns (Data period 1985-2007)**

	12-month holding			24-month holding			36-month holding			48-month holding			60-month holding			120-month holding			180-month holding		
	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ
Art	11.30%	24.64%	0.4585	9.44%	21.32%	0.4427	7.92%	18.91%	0.4190	6.40%	16.36%	0.3916	4.83%	13.01%	0.3711	2.65%	4.52%	0.5851	2.58%	3.81%	0.6773
OM	7.85%	16.79%	0.4672	6.47%	13.59%	0.4758	5.56%	12.36%	0.4496	4.57%	10.56%	0.4327	3.72%	8.56%	0.4349	3.07%	2.15%	1.4283	2.70%	2.70%	0.9988
Modern	10.35%	22.84%	0.4533	8.95%	19.15%	0.4674	7.64%	16.76%	0.4556	6.42%	14.76%	0.4350	5.25%	12.28%	0.4275	2.34%	4.90%	0.4769	2.50%	2.99%	0.8372
Cont	13.24%	28.22%	0.4692	11.16%	21.99%	0.5077	10.19%	19.45%	0.5238	9.07%	17.31%	0.5237	7.68%	14.53%	0.5288	4.39%	5.05%	0.8697	4.49%	3.32%	1.3518
Equities	13.15%	17.59%	0.7480	11.59%	13.23%	0.8760	10.41%	10.37%	1.0039	9.77%	8.72%	1.1204	9.06%	6.87%	1.3197	9.70%	2.49%	3.8899	9.19%	2.78%	3.3030

μ = average annual return; σ = annual standard deviation; μ/σ = risk-adjusted return

Net **Nominal Holding-Period Returns (Data period 1985-2007)**

	12-month holding			24-month holding			36-month holding			48-month holding			60-month holding			120-month holding			180-month holding		
	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ	μ	σ	μ/σ
Art	-16.53%	18.48%	-0.8945	-5.22%	18.47%	-0.2827	-1.94%	17.18%	-0.1132	-0.98%	15.22%	-0.0643	-1.03%	12.28%	-0.0841	-0.26%	4.39%	-0.0603	0.63%	3.74%	0.1693
OM	-19.12%	12.59%	-1.5179	-7.80%	11.77%	-0.6625	-4.09%	11.23%	-0.3647	-2.69%	9.83%	-0.2736	-2.08%	8.08%	-0.2572	0.15%	2.09%	0.0720	0.75%	2.65%	0.2818
Modern	-17.23%	17.13%	-1.0060	-5.64%	16.59%	-0.3403	-2.21%	15.23%	-0.1449	-0.96%	13.74%	-0.0702	-0.64%	11.59%	-0.0548	-0.56%	4.77%	-0.1182	0.56%	2.93%	0.1898
Cont	-15.07%	21.16%	-0.7121	-3.73%	19.04%	-0.1960	0.11%	17.67%	0.0063	1.50%	16.11%	0.0930	1.66%	13.72%	0.1211	1.43%	4.91%	0.2919	2.51%	3.26%	0.7688
Equities	9.26%	22.61%	0.4093	11.03%	13.16%	0.8381	10.04%	10.33%	0.9717	9.50%	8.70%	1.0917	8.85%	6.85%	1.2906	9.59%	2.49%	3.8498	9.12%	2.78%	3.2790

μ = average annual return; σ = annual standard deviation; μ/σ = risk-adjusted return

Appendix XI: Correlation coefficients for all asset classes and Art sub-segments

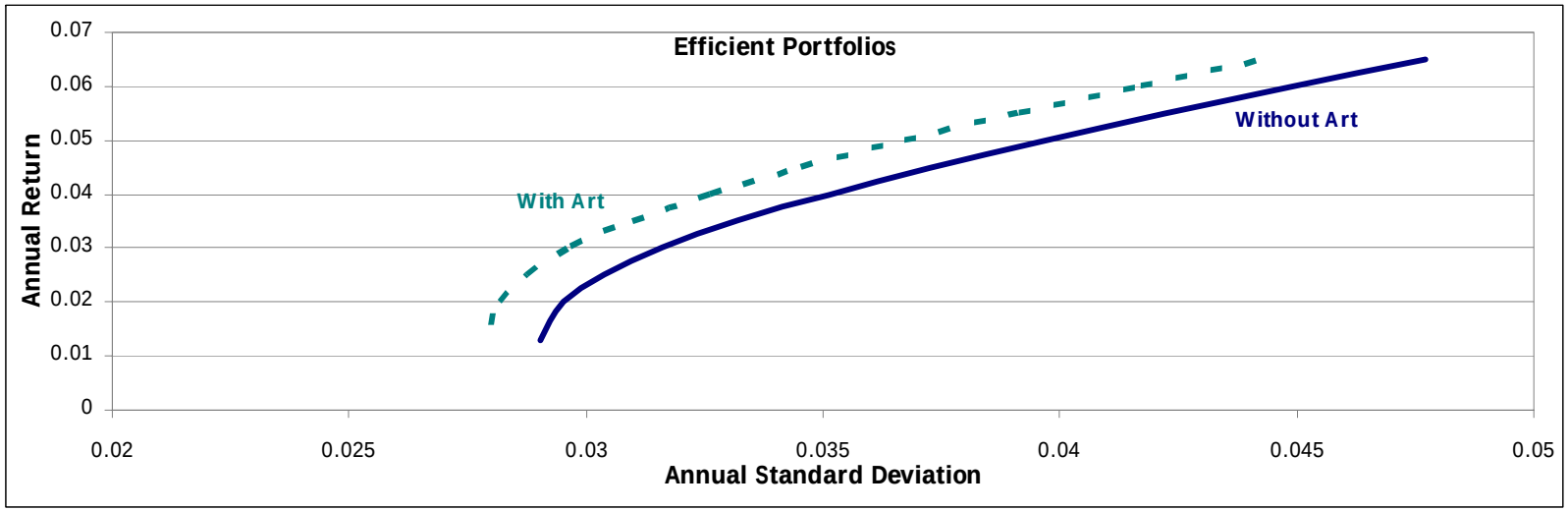
Correlation Matrix (1990-2007)

	Art	OM	Modern	Cont	Equities	Bonds - Aggr	Bonds - Treas	Property	REITs
Art	1.0000	0.7180	0.8307	0.5762	0.2964	-0.3070	-0.2446	0.2418	0.1014
OM		1.0000	0.6566	0.5402	0.2920	-0.0831	-0.0032	-0.0096	0.0660
Modern			1.0000	0.5896	0.0856	-0.2734	-0.2771	0.0935	0.0693
Cont				1.0000	0.0393	-0.0230	0.0174	-0.2578	-0.1026
Equities					1.0000	-0.2036	-0.1342	0.4441	0.2559
Bonds - Aggr						1.0000	0.9795	-0.0733	0.1354
Bonds - Treas							1.0000	-0.0787	0.0951
Property								1.0000	0.7872
REITs									1.0000

Correlation Matrix (1994-2007)

	Art	OM	Modern	Cont	Equities	Bonds - Aggr	Bonds - Treas	Property	REITs	Hedge Funds
Art	1.0000	0.5821	0.7176	0.5473	0.3436	-0.2260	-0.1579	0.1342	-0.0684	0.0392
OM		1.0000	0.3690	0.3763	0.3930	-0.0142	0.1265	-0.0588	-0.1425	0.3652
Modern			1.0000	0.4827	0.1034	-0.2372	-0.2580	0.1028	-0.0649	-0.1000
Cont				1.0000	0.0664	0.0838	0.1574	-0.3138	-0.2200	-0.0241
Equities					1.0000	-0.3118	-0.2350	0.3616	0.1907	0.5208
Bonds - Aggr						1.0000	0.9724	-0.1480	0.0893	0.0378
Bonds - Treas							1.0000	-0.2116	0.0170	0.0686
Property								1.0000	0.8696	0.2223
REITs									1.0000	0.2628
Hedge Funds										1.0000

Appendix XII: Efficient Frontier Calculations (based on data from 1994-2007)



	Portfolio Weights 1994-2007							Annual return	Annual std. deviation	Risk-adjusted return
	Art	Equities	Bonds - Aggr	Bonds - Treas	Property	REITs	Hedge Funds			
Minimum Variance		8.19%	88.68%	0.00%	2.47%	0.00%	0.67%	1.28%	2.90%	0.4411
	5.27%	5.60%	84.80%	0.00%	2.24%	0.00%	2.10%	1.59%	2.80%	0.5690
Return: 2.0%		7.16%	83.04%	0.00%	3.40%	0.00%	6.40%	2.00%	2.95%	0.6777
	5.82%	4.79%	81.48%	0.00%	2.69%	0.00%	5.22%	2.00%	2.82%	0.7100
Return: 2.5%		6.45%	79.12%	0.00%	4.04%	0.00%	10.39%	2.50%	3.04%	0.8234
	6.51%	3.80%	77.37%	0.00%	3.25%	0.00%	9.07%	2.50%	2.87%	0.8703
Return: 3.0%		5.74%	75.19%	0.00%	4.69%	0.00%	14.38%	3.00%	3.16%	0.9491
	7.19%	2.81%	73.26%	0.00%	3.82%	0.00%	12.92%	3.00%	2.97%	1.0107
Return: 3.5%		5.03%	71.27%	0.00%	5.33%	0.00%	18.37%	3.50%	3.32%	1.0540
	7.88%	1.82%	69.16%	0.00%	4.38%	0.00%	16.77%	3.50%	3.10%	1.1290
Return 4.0%		4.31%	67.35%	0.00%	5.98%	0.00%	22.36%	4.00%	3.51%	1.1393
	8.56%	0.82%	65.05%	0.00%	4.94%	0.00%	20.62%	4.00%	3.26%	1.2256
Return: 4.5%		3.60%	63.43%	0.00%	6.62%	0.00%	26.35%	4.50%	3.73%	1.2075
	9.20%	0.00%	60.94%	0.00%	5.48%	0.00%	24.38%	4.50%	3.45%	1.3026
Return: 5.0%		2.89%	59.50%	0.00%	7.27%	0.00%	30.34%	5.00%	3.96%	1.2614
	9.62%	0.00%	56.77%	0.00%	5.89%	0.00%	27.71%	5.00%	3.67%	1.3619
Return: 5.5%		2.17%	55.58%	0.00%	7.91%	0.00%	34.33%	5.50%	4.22%	1.3036
	10.04%	0.00%	52.61%	0.00%	6.31%	0.00%	31.04%	5.50%	3.91%	1.4063
Return: 6.0%		1.46%	51.66%	0.00%	8.56%	0.00%	38.32%	6.00%	4.49%	1.3366
	10.46%	0.00%	48.45%	0.00%	6.73%	0.00%	34.37%	6.00%	4.17%	1.4391
Return: 6.5%		0.75%	47.74%	0.00%	9.21%	0.00%	42.31%	6.50%	4.77%	1.3623
	10.88%	0.00%	44.29%	0.00%	7.14%	0.00%	37.69%	6.50%	4.44%	1.4630

Without Art
With Art

Appendix XIII: Life-insurance charges per guarantee-class in Denmark, 2005-2007

		Percent		
		2005	**2006**	**2007**
Non-market oriented life insurance companies	no guaranteed or 0% guarantee	10.73%	11.91%	12.61%
	guarantees over 0% up to 4%	35.65%	37.56%	46.43%
	guarantees over 4%	53.62%	50.53	40.96%
	All life-insurance-/pension-charges	100.00%	100.00%	100.00%
Market oriented life insurance companies	no guaranteed or 0% guarantee	5.66%	6.09%	6.79%
	guarantees over 0% up to 4%	30.03%	34.03%	37.99%
	guarantees over 4%	64.30%	59.87%	55.21%
	All life-insurance-/pension-charges	100.00%	100.00%	100.00%
All companies	no guaranteed or 0% guarantee	7.97%	8.88%	9.56%
	guarantees over 0% up to 4%	32.59%	35.72%	42.00%
	guarantees over 4%	59.44%	55.40%	48.44%
	All life-insurance-/pension-charges	100.00%	100.00%	100.00%

Source: adapted from Danish Financial Supervisory Authority, Table 10 (FSA, 2008)[182]

[182] The Danish Financial Supervisory Authority, Finanstylsynet, viewed August 8th, 2008, http://www.finanstilsynet.dk/graphics/finanstilsynet/mediafiles/newdoc/statistik/8/MU2007_LIPE.pdf

Appendix XIV: Efficient portfolio calculations
(guided by guaranteed pension return rates and actual asset allocation in 2007)

	Portfolio Wheights 1994-2007							Annual return	Annual std. deviation	Risk-adjusted return
	Art	Equities	Bonds - Aggr	Bonds - Treas	Property	REITs	Hedge Funds			
after-tax avg. guaranteed rate: 3.0%	7.19%	2.81%	73.26%	0.00%	3.82%	0.00%	12.92%	3.00%	2.97%	1.0107
pre-tax avg. guaranteed rate: 3.75%	8.22%	1.32%	67.10%	0.00%	4.66%	0.00%	18.70%	3.75%	3.18%	1.1799
after-tax max. guaranteed rate: 4.5%	9.20%	0.00%	60.94%	0.00%	5.48%	0.00%	24.38%	4.50%	3.45%	1.3026
pre-tax max. guaranteed rate: 5.6%	10.12%	0.00%	51.78%	0.00%	6.39%	0.00%	31.70%	5.60%	3.96%	1.4137
Allocation 2007 (fixed)		28.15%	45.41%	14.01%	2.64%	5.85%	2.99%	4.64%	4.96%	0.9353
Allocation guided by 2007 (MinVar)	0.00%	28.15%	49.35%	14.01%	2.64%	5.85%	0.00%	4.27%	4.76%	0.8965
Allocation guided by 2007 (MaxR)	0.00%	28.15%	45.41%	14.01%	2.64%	9.79%	0.00%	4.88%	5.02%	0.9725

Note: 24% tax-rate assumed, average guaranteed rates based on 2007 figures for Denmark (see Appendix XIII), asset allocation in 2007 based on FSA figures (see Appendix IV)

Appendix XV: Prudent person principles

OECD Insurance and Private Pensions Committee and Working Party on Private Pensions (2006)[183]	
Principals of investing (from Annex I.2.1)	Investment should be undertaken with • care • skill of and expect • prudence • due diligence "Where they lack sufficient expertise to make fully informed decisions and fulfil their responsibilities the governing body and other appropriate parties should be required to seek the external assistance of an expert."
Fiduciary duties (from Annex I.2.2)	• Governing bodies of pension institutions should be subject to fiduciary duties to pension plans or fund as well as its members and beneficiaries . • Investments shall be undertaken in the best interest of plan members and beneficiaries under the exercise of due diligence along the processes.
Process requirements (from Annex I.2.3	• The establishment of rigorous processes for investing shall be legally required. • Specifications of processes should establish internal controls, procedures for effective implementation and monitoring of the investment management process.
European Commission (1999, especially Chapter V.5)[184]	
Security	• Security is considered as the "single most important principle to be applied in all circumstances". • It implies that all decisions and activities shall be undertaken in order to achieve and maintain - but by no means jeopardize - the ability to provide adequate retirement income to beneficiaries at all times. It concerns both, the liability as well as asset side and therefore pertains not only to DB and CB plans facing obligations but also to DC schemes. • The remaining principles are subordinated but designed to support this objective of security.
Profitability	• **Profitability** calls for optimal and most efficient execution of all pension institutions activities in order to reduce unnecessary costs and assure the affordability of pension plans. • The principle calls for cost-consciousness regarding the management of both, assets and liabilities, as well as administrative activities and reporting.
Diversification	• **Diversification**, that is the avoiding of undue concentration of holdings in single securities or certain asset classes, should always serve as a leitmotiv for investment decisions so that (unnecessary) portfolio risks are reduced.
Quality	• **Quality** should be a crucial objective for the process and contents of pension institutions' activities. Due diligence and consistency are key in both, the daily conduct of business as well as the strategic and tactical selection of assets.
Liquidity	• **Liquidity** mandates that investment strategies and risk-management measures are undertaken with consideration of each pension plan's individual requirements for solvency which might vary with, for example, the respective maturity of schemes.

[183] OECD Insurance and Private Pensions Committee and Working Party on Private Pensions 2006, *OECD Guidelines on Pension Fund Asset Management: Recommendation of the Council*, viewed 1 June 2008, http://www.oecd.org/dataoecd/59/53/36316399.pdf.

[184] European Commission 1999, Rebuilding Pensions: Security, Efficiency, Affordability. Recommendations for a European code of Best Practice for Second Pillar Pension Funds, viewed 4 July 2008, http://ec.europa.eu/internal_market/pensions/docs/studies/1999-occupa-full_en.pdf

Appendix XVI: Art Investment Funds

Key Features of Art Investment Funds	
Organisational set-up	closed private-equity funds (exception: Fernwood Art Investment which is organised as an open-ended fund)[185]
Target volume of Art portfolios	USD40 million up to USD200-350 million Note: There can often be a big differences between targeted fund size & actual volume achieved.
Composition of Art portfolios	varying with strategic approaches
Target returns	10-15% up to 35% on compound annual basis (depending on strategy & segment)
Minimum investment	USD200,000-1,000,000[186]
Minimum period of investment	5-7 years up to 10 years lock-up period
Management fee	2-4% (sometimes additional charges are made for expenses) [187]
Performance fee	20-30% of profits (in case annual hurdle rate of return is exceeded) [188]

The recent increase in activity on the Art market and the acceptance of alternative investment vehicles has established the basis for the Art investment funds. However, this is not a new phenomenon. In the 70s, the growth in prosperity led to the introduction of the first modern investment funds, but it is only not that this market really starts to take off.

The overall purpose of an Art investment fund is to exploit and thereby **profit from the inefficiencies** of the Art market by leveraging a higher level of knowledge and a significant pool of investment funds.

In practise, the Art Investment Funds function like most other investment funds. The pool of investment funds is established by the various passive investors and managed by the management team. In most cases there is a minimum investment requirement, as there are relatively high administration costs connected with investment funds. The **minimum investment sum** varies from USD200.000-1.000.000. Moreover, the **investment is usually locked-up** for the lifetime of the fund, which varies usually vary between 5-7 years. Furthermore, the investors are obliged to pay an annual **management fee** in the range of 2-4%and a 20% **charge on investment performance.** As it can be noticed, there are indeed various similarities between Art investment funds and most other investment funds, as those for Private Equity, for instance. However, the differences are more relevant to notice, as these do not favour these new types of investment vehicles.

One of the main differences is the **lack of track record** and high specialization level, as a result of the higher complexity. As it is mentioned in Section 4, the selection and monitoring of this new vehicle is significantly more complex then most other investment opportunities. However, this was also the case with Private Equity in the beginning[189].

As discussed previously, the main advantage of the Art Investment Funds is the ability to establish a large enough investment pool with a competent management. In regards to the institutional investors, it is the knowledge and skills that they benefit from.

The most prominent examples of currently operating Art investment funds (2008):

- Art Trading Fund
- Fernwood Art Investment
- China Investment Fund
- American Art Fund
- Crayon Capital
- The Copal Art Investment Fund (CAIF)
- Meridian Art Partners
- Prime Art Management Ltd.

[185] Gutner, T & Capell, K 2005, 'Funds To Please The Eye', *BusinessWeek*, February 14th, viewed 20 September 2008, http://www.businessweek.com/magazine/content/05_07/b3920109_mz070.htm

[186] Weil (2008), see Appendix I for interview details

[187] Salmon, F 2007, 'The Art Trading Fund – Still doomed to fail', *Portfolio.Com*, June 26th, viewed 1 July 2008, http://www.portfolio.com/views/blogs/market-movers/2007/06/26/the-art-trading-fund-still-doomed-to-fail

[188] Salmon, F 2007, 'The Art Trading Fund – Still doomed to fail', *Portfolio.Com*, June 26th, viewed 1 July 2008, http://www.portfolio.com/views/blogs/market-movers/2007/06/26/the-art-trading-fund-still-doomed-to-fail

[189] Weil 2008, see Appendix I for interview details

Appendix XVII: The British Rail Pension Fund

Key Characteristics and Statistics of the British Rail Pension Fund (BRPF)	
Volume and Size of Art portfolio	£ 40 million 2.9% of AUM 2.245 Art pieces
Composition of Art portfolio	Impressionist Old Paintings Old Master drawings Chinese works European works Antiques
Return	11.3 %[190] compound annual return
Period of investment	1974-1999
Fund Managers	David Adams Jeremy Eckstein - Art advisor
Fund Advisors	Sotheby's (conflict of interests and competitive advantage)
Financial Climate	30 % annual inflation Poor investment opportunities

Twenty-one years ago, when the British Rail Pension Fund (BRPF) decided to invest 2.9% of its assets in Impressionist and Old Master paintings, Old Master drawings, Chinese and European works of Art and antiquities, it was not an acceptable investment decision. Sotheby's, the pension fund's adviser, was believed to have a conflict of interest because most of the art was bought at auctions[191].

The pension fund paid about USD64 million (2.9% of its AUM) for 2,245 items over eight years. The fund later justified that its decision to invest in Art was reasoned by the poor economic conditions at the time; it said that in addition to 30% annual inflation, "the London Stock Market had fallen heavily, creating huge losses on many investment portfolios; the property market had collapsed; many leading financial institutions were overstretched, and exchange controls and a higher dollar premium made it difficult to diversify overseas"[192].

At liquidation, most of the works of BRPF's Art portfolio brought prices around their estimated values and two paintings failed to sell. Even though, prices were far above what the pension fund had paid[193]. However, the lucrative returns were derived from only the top 10 % of the holding[194].

[190] Gopinath, D 2006, 'Picasso Lures Hedge-Fund-Type Investors to Art Market', *Bloomberg*, January 26th, viewed 1 July 2008, http://www.bloomberg.com/apps/news?pid=10000088&sid=aCTxxmKVlgWI&refer=culture

[191] Vogel , C 1995, 'Inside Art', The New York Times, July 7th, viewed 20 September 2008, http://query.nytimes.com/gst/fullpage.html?res=990CE5DD1F3FF934A35754C0A963958260&sec=&spon=&pagewanted=all

[192] Vogel , C 1995, 'Inside Art', The New York Times, July 7th, viewed 20 September 2008, http://query.nytimes.com/gst/fullpage.html?res=990CE5DD1F3FF934A35754C0A963958260&sec=&spon=&pagewanted=all

[193] Vogel , C 1995, 'Inside Art', The New York Times, July 7th, viewed 20 September 2008, http://query.nytimes.com/gst/fullpage.html?res=990CE5DD1F3FF934A35754C0A963958260&sec=&spon=&pagewanted=all

[194] Forbes 2004, 'Art Appreciation: Get ready, because art investment funds are on the way', *Forbes.Com*, March 12th, viewed 20 September 2008, http://news.morningstar.com/articlenet/article.aspx?id=105204#hide

Appendix XVIII: Possible Investment Volume of Danish Funds into Art

	Assets under Management		Possible Investment Volume into Art		
	EUR (million)	USD (million)[195]	0.10%	0.25%	0.50%
Top 11 Danish Pension Funds (2007, in AUM)[196]					
1. ATP (Arbejdsmarkedets Tillægspension)	99,900	129,870	130	325	649
2. ATP Ejendomme	45,000	58,500	58	146	292
3. PFA Pension	28,643	37,236	37	93	186
4. Danica Pension	25,000	32,500	32	81	162
5. KP (Kommunernes Pensions Forsikring)	12,000	15,600	16	39	78
Total Top 5 Danish Pension Funds	**210,543**	**273,706**	**274**	**684**	**1,369**
6. Sampension	12,000	15,600	16	39	78
7. Pen-Sam	10,000	13,000	13	32	65
8. LD (Lønmodtagernes Dyrtidsfond)	8,521	11,078	11	28	55
9. Pension Danmark	8,190	10,647	11	27	53
10. Pensionkassen for Sygeplejersker	7,111	9,244	9	23	46
11. MP Pension	6,817	8,862	9	22	44
Total Top 11 Danish Pension Funds	**473,724**	**615,841**	**616**	**1,540**	**3,079**
Total Global Pension Funds (2006)[197]		**22,702,000**	**22,702**	**56,755**	**113,510**

[195] figures are converted to USD with the exchange rate of o.769231 EUR/USD from 30 July 2008 (www.exchangerate.com)
[196] data for AUM in Eur of Top 11 Danish funds is taken from Pension Funds Online 2008, 'Top 100 European Funds', viewed 30 July 2008, http://www.pensionfundsonline.co.uk/pdfs/Top-100-European-Pension-Funds.pdf
[197] data for AUM of Global Pension Funds from Maslakovic, M 2007, '*Fund Management 2007*', IFSL Research, viewed 19 June 2008, http://www.ifsl.org.uk/upload/CBS_Fund_Management_2007.pdf