Quarterly Review of Economics and Finance 97 (2024) 101865

Contents lists available at ScienceDirect

Quarterly Review of Economics and Finance

journal homepage: www.elsevier.com/locate/qref

Beyond financial wealth: The experienced utility of collectibles ☆

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ARTICLE INFO

JEL classification:
G11
G40
G59

Keywords:
Collectibles
Collecting
Decision utility
Event recall method
Experienced utility
Non-standard utility

ABSTRACT

We argue that the utility of specific assets, in our case collectibles, is not only derived from the financial outcome, but also from the conditions that prevail until a financial outcome may be realized. Therefore, we derive a multi-attribute utility function that measures financial returns — using a mean-variance utility function — on the one hand, and non-financial returns — using an experienced utility function — on the other. We then reveal the trade-off between financial and non-financial utility by analyzing 363 owners of collectibles. We divide the owners into the group of collectors and the group of investors, based on their self-reported motivation. Our results suggest that collectors receive almost no utility from financial returns, but rather from experience. The opposite is the case for investors. Our findings help to explain the reported financial underperformance of collectibles and suggest to adjust existing models of utility.

> *"Many economists, dating back to Adam Smith, have emphasized that factors beyond wealth [...] enter into the utility function".*
>
> [Levitt and List (2007)]

1. Introduction

The analysis of the needs and preferences of economic subjects is one of the core topics of economic research. The concept of utility is fundamental and primarily used to model decision maker preferences over objects or actions. One of the first in-depth thoughts on utility have their origin in the works of Adam Smith, who distinguished between value in use and value in exchange (see Smith, 1976). Over time, the understanding of utility has changed and basically two different types have emerged, namely 'decision utility' and 'experienced utility'. Today, one usually considers decision utility when measuring the utility of certain goods or actions. Preferences are derived from the observed decisions made by utility-maximizing entities. Here, decisions are based on their expected future outcomes. Rational individuals choose the option that produces the highest expected utility (see Bernoulli, 1738; von Neumann & Morgenstern, 1944). Individuals are considered rational if their investment decisions are driven by the pursuit of maximizing the return on investment for a given level of risk. This basically negates other (non-financial) motivations that may have an impact on investment decisions (see e.g. Statman, 2005).[1] From our point of view, this could particularly apply to the asset class of collectibles. This asset class, which includes art and various other items, is subject to a variety of non-financial motivational aspects, which may occur throughout the entire collecting process. An example is the so-called 'thrill of the hunt' in the collecting process, which describes the satisfying feeling when a collectible is found after a long search (see e.g. McIntosh & Schmeichel, 2004). Despite the recognition of the dualistic nature of the collector's utility, it has been presented only theoretically so far (see e.g. Beal et al., 2005; Mandel, 2009; Menestrel, 2001; Rastegar et al., 2024). The

☆ The authors would like to thank Eric Hughson (the editor) and an anonymous referee for their valuable comments and suggestions, which helped a lot to improve the paper and to better explain some of the striking results. All remaining errors and omissions are the authors' sole responsibility.

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[1] There is considerable evidence in the literature for the existence of a utility that goes beyond a purely financial and outcome-based to a more non-financial and process-based form. For example, Menestrel (2001) argues that a gambler not only seeks to optimize the future outcome, but also values the experience that occurs during the gambling process. Therefore, he proposes a general model that combines the utility, which results from the processes and from the consequences. Similar to the gambling case, Dorn and Sengmueller (2009) assume a non-financial utility for the investor when trading. They argue that entertainment motives can be a possible compensation for the loss of performance through excessive trading. More recently, sustainable investments have also become apparent in terms of a non-financial utility (see e.g. Beal et al., 2005).

https://doi.org/10.1016/j.qref.2024.101865
Received 31 October 2022; Received in revised form 16 May 2024; Accepted 17 May 2024
Available online 31 May 2024

present paper proposes a multi-attribute utility function for collectors and empirically demonstrates the existence of financial as well as non-financial utility components.

Our theoretical contribution lies in the derivation of a multi-attribute utility function for collectibles. We argue that a specific utility or disutility for collecting depends not solely on the financial outcome, which makes a standard utility function inappropriate. We further discuss that the pleasure or displeasure gained from owning collectibles is a matter of process rather than consequence. In order to model the non-financial payoff from owning collectibles, we draw on experienced utility. The approach has become known to the general public especially through Daniel Kahneman's book *Thinking, Fast and Slow*. It is worth mentioning that this is not a completely new approach. The general idea can be traced back to the works of Jeremy Bentham. He argues that the action or object, which maximizes happiness and well-being for all individuals concerned, is to be preferred (see Bentham, 1789). In contrast to decision utility, experienced utility refers to the hedonistic experience.[2] In other words, it captures both pleasure and pain, associated with a particular action or object. In order to model the financial part of the utility function, we rely on a common mean–variance function. Combining both parts, we obtain an multi-attribute utility function that accounts for both financial and non-financial motives. Against this background, we assume that the relevance of the two components of the utility function differs for specific types of collectors. We therefore distinguish between three types, namely the collector, the hybrid, and the investor. We use the respondents' self-reported motivations to classify them. While the collector acts primarily for non-financial reasons, the investor holds collectibles mainly for financial reasons. The hybrid type exhibits both financial and non-financial motives in a more or less balanced way.

Our empirical contribution is based on a survey of 2,000 individuals in Germany with age over 18 years, of whom a total of 18.1 percent describe themselves as owners of collectibles for investing or collecting purposes. Compared to the rest of the respondents, they tend to be younger and male on average. They also exhibit higher levels of education, higher incomes and greater net wealth. Coins, books and stamps are the most preferred collected items. We infer both financial (decision) and non-financial (experienced) utility and show that these utility components differ significantly across the three defined groups (collectors, hybrids and investors). Financial utility is most prevalent among investors, whose average return expectation on an annual basis is approximately 36 percent. At first glance, this value appears to be unrealistic high, which is why we point out that the dataset was collected during a period characterized by a notable surge in interest surrounding a special form of digital collectibles, the so-called Non-Fungible Tokens (NFTs). This episode between 2020 and 2021 notably affects our individuals' return expectations as several of them reaped substantial financial rewards from trading NFTs during the period. Various studies have shown that investors often extrapolate their past returns or experiences into the future (see e.g. Dominitz & Manski, 2010; Greenwood & Shleifer, 2014). While this may introduce a bias to the return expectations, it reflects prevalent economic behavior and trends at the time.

In contrast to the investors, collectors do not expect any growth in value of their collection, instead they expect a negative annual return of approximately 2 percent on average. When calculating the non-financial part of our utility function, we use the so-called 'Event Recall Method' (ERM), proposed by Kahneman et al. (2004b). We report that experienced utility is most prevalent among collectors, followed by hybrids and investors. Also, the average net affect was significantly higher for collectors compared to investors. Running a logistic regression model and controlling for demographics, we demonstrate that our results are robust. A trade-off arises between financial and non-financial motives, respectively between decision and experienced utility. This is well illustrated as one considers both extremes of the collector types. A pure collector, who acts only on the basis of non-financial motives, is more or less indifferent whether the collection increases in value, remains the same, or even falls. What counts is the emotional return that the collection promises to him or her. In contrast, there is the pure investor who acquires the object, stores it, and later sells it without perhaps ever actually having spent any significant time with the collection.

Our proposed extension of the purely financial view to a utility function that includes an experienced utility component helps to explain the reported underperformance of asset classes such as collectibles.[3] Even when underperformance is attested to collectibles based on standard risk-return and liquidity considerations, an investment equilibrium can still be plausible. Individual behavior may no longer appear irrational. Taking non-financial experienced utility into consideration, overall utility from collectibles may even surpass the utility provided by standard investments for some individuals.

The remainder of the paper is organized as follows. In Section 2, we outline our non-standard utility function and show how to measure both decision utility and experienced utility. Section 3 introduces our data set. In Section 4, the results are presented and discussed. Concluding remarks and final thoughts are offered in Section 5.

2. Conceptual framework and hypotheses

In the first step, we review the motives for collecting and argue why we choose a non-standard utility function for our purposes. In the second step, we define the financial and non-financial part of our non-standard utility function. We also outline methods for gathering and measuring experienced utility. Finally, we state our hypotheses in order to test our theoretical considerations.

2.1. Collecting as investment and consumption

Regardless of its origins and functions, collecting has always connected people and is a source of joy for all those who are enthusiastic about the accumulation of more or less useful things. Pleasure can express itself in different ways depending on the individual. One collector, for example, enjoys sharing the knowledge about ancient coins with other like-minded people, while another experiences pleasure with the own collection of model cars behind closed doors. A third person, in turn, likes presenting the own 'Picasso', comparable to a form of conspicuous consumption. Motives for collecting are manifold and collecting as a leisure activity has a positive effect on the human psyche (see e.g. Olmsted, 1991). However, when collecting gets out of proportion, these positive aspects can turn into the exact opposite. The own passion can develop into a real addiction, comparable to drugs or gambling. An example for this is the excessive accumulation of objects. This phenomenon is also known as hoarding, which can lead to increased interpersonal conflicts and in some cases to social isolation (see e.g. Nordsletten & Mataix-Cols, 2012). As we can see, the reduction of collectibles to a purely financial asset seems too simple. We assume that there are other aspects that determine their utility. A modified utility function can be used instead of a standard utility function. For collectibles, Carey (2008) argues that a collector derives utility from both the actual use and through the completion of the collection.

[2] There is a growing body of literature on happiness research in various disciplines that uses experienced utility as the basis for empirical analysis (see e.g. Cheng et al., 2021; Flores et al., 2015; Mora, 2021; Vos et al., 2015).

[3] Evidence of an underperformance of collectibles as compared to traditional asset classes, such as cash, bonds or equities, can be found for various types of collectibles and periods, including art (see e.g. Mei & Moses, 2002; Renneboog & Spaenjers, 2013), stamps (see e.g. Dimson & Spaenjers, 2011; Grable & Watkins, 2015), fine wines (see e.g. Masset & Weisskopf, 2018), books (see e.g. Erdős & Ormos, 2012) and classic cars (see e.g. Laurs & Renneboog, 2019).

Another example is Mandel (2009), who argues that collectibles, in particular art, can serve as a signal of wealth.[4] In contrast to previous models, we suggest a more general non-financial utility component, which arises within the collecting process.[5]

Following McIntosh and Schmeichel (2004), the investment process in collecting can be divided into different stages, in which a non-financial utility can occur. The process begins with the decision to collect, followed by the search for the (first) object and its acquisition. It is often the thrill of the hunt for a particular object, which gives the collector so much pleasure in success, but also pain in failure. The non-financial utility during the ownership phase can manifest itself in a variety of ways, for example as a form of conspicuous consumption. However, the pleasure can also occur during personal exchanges with other enthusiasts about the origin, age and history of the object. And even in the final phase, i.e. the liquidation of one's own collection, a non-financial benefit can take place, for example through a donation to a museum in order to serve society (see e.g. Pearce, 1992).

2.2. Defining the utility function

As discussed in Section 2.1, owners of collectibles can have both financial and non-financial motives, from which specific types of collectors can be derived. To describe the utility of owners of collectibles, we first define the utility function of the typical investor. In a second step, we define the utility function of the typical collector. Finally, we combine both functions to describe all those who share both motives, which we describe as a hybrid type.

2.2.1. Investor utility

The archetype of the investor is the individual for whom buying collectibles is a purely financial transaction. Aspects such as completing one's own collection, the pleasure of looking at the object, or the social interaction with other collectors play no significant role for him. Put simply, the investor does not buy the object because he likes it in the first place, but because he assumes that it has a financial value in the future. Also, he does not put it on a shelf where it can be admired, but stores it in a safe place, protected from external impact and risk. Consequently, if we want to model the investor's utility, we basically have to restrict ourselves to the monetary aspect only. In order to define the financial part of the utility function, we rely on a type of utility functions commonly used in economic theory, especially in portfolio optimization. Following Markowitz (1952), two parameters, namely expected return (mean) and risk (variance), are decisive for an individual when assessing an investment or a portfolio. The pure investor's utility function can therefore be expressed as follows,

$$U_I = f(E_R, \sigma_R), \tag{1}$$

where E_R is the expected return of the investment or portfolio and σ_R is the corresponding risk (standard deviation). For the investor's utility U_I non-financial motives are not considered. For our purpose, we use a quadratic utility function. Assuming that utility increases with the expected return and decreases with corresponding risk (as long as the individual is risk averse), the following utility function can be formulated,

$$U_I = E_R + \alpha \frac{1}{2}\sigma_R^2, \tag{2}$$

where α is restricted to $-1 \geq \alpha < 0$ for risk averse and $0 > \alpha \leq 1$ for risk seeking individuals. Individuals with $\alpha = 0$ are considered to be risk neutral. E_R describes the expected return and σ_R the corresponding standard deviation of the expected returns. The mere financial measures (return and risk) of the present utility function make clear that non-financial returns (e.g. joy through collecting as a leisure activity) and non-financial risks (e.g. pain through uncontrolled compulsive collecting) are not taken into account. To determine the return and the corresponding risk, the questionnaire asks for the minimum return, the maximum return and the expected return. A collection value of €1,000 and a period of one year is assumed. Further budget restrictions are not considered.

2.2.2. Collector utility

To model the non-financial part of the utility function, we are guided by the pure collector. According to McIntosh and Schmeichel (2004), a collector is primarily characterized by the fact that the instrumental function of each collected object is only of secondary interest. In addition, the collector has to be distinguished from the accumulator, because the latter amasses passively and uncritically a multitude of objects. Finally, financial motives are also secondary for the collector as his main interest is to build, expand and complete the own collection (see e.g. Baekeland, 1981). In order to model the non-financial payoff from owning collectibles, we turn to the concept of 'experienced utility'. It is worth mentioning that the concept can be traced back to the works of Jeremy Bentham. In his work *An introduction to the principles of morals and legislation*, Bentham (1789) postulates that "nature has placed mankind under the governance of two sovereign masters, pain and pleasure. It is for them to point out what we ought to do, as well as to determine what we shall do" (p. 1). Bentham's guiding principle is therefore a hedonistic calculation, where every action or object should be judged according to whether it causes pleasure or pain for the individuals concerned. While Jeremy Bentham uses in his felicific calculus a total of seven factors, Kahneman reduces the complexity to only two factors: duration and intensity of pleasure and pain.[6] Following Kahneman's approach, we can model the collector's utility function as follows,

$$U_C = f(P, t), \tag{3}$$

where P is the intensity of pleasure and pain felt by the collector. Parameter t represents the corresponding time. In order to collect data of experienced utility in empirical studies, different methods and measurements have been established, which can measure both

[4] In general, the two overarching motives for collecting are consumption and investment (see e.g. Belk, 1995; Kleine et al., 2020; Mandel, 2009). Examples of non-standard utility functions can be found not only for collectibles, but also for other forms of investments (see e.g. Beal et al., 2005; Menestrel, 2001; Rastegar et al., 2024).

[5] Collectibles are closely tied to the auction literature due to their special characteristics as compared to standard goods. One notable aspect of collectors' participation in auctions is the phenomenon of emotional engagement as a form of additional utility, often referred to as 'auction fever' (see e.g. Jones, 2011; Podwol & Schneider, 2016) or other similar terms like 'bidding frenzy' (see e.g. Haeubl & Leszczyc, 2018), 'opponent effect' (see e.g. Heyman et al., 2004), and 'joy of winning' (see e.g. Cooper & Fang, 2008). These terms describe the heightened emotional states that collectors experience during a bidding competition. Such emotions can arise from the desire to acquire coveted items, the fear of missing out, or the excitement of outbidding the competition. The auction literature explores the psychological and behavioral dimensions of these emotions, examining their impact on bidding strategies, final prices and the auction experience as a whole. Understanding these emotional aspects is important to understanding the complicated relationship between collectibles, auctions and the individuals involved.

[6] Bentham assumed a measurability in the form of a so-called 'felicific calculus'. In fact, it remained a theoretical construct without any real practical (in terms of a direct measurement) application, not only due to its high complexity and impossibility to observe and measure (see Kahneman et al., 1997). Bentham identifies seven characteristics that influence the subjective value of pleasure and pain. First, duration, i.e. how long does the pleasure last. Second, intensity, i.e. how intense is the pleasure. Third, certainty, i.e. how certain are you that it will come. Fourth, propinquity, i.e. how near is the actual pleasure. Fifth, fecundity, i.e. how much will it lead to more pleasure. Six, purity, i.e. how free of pain is the pleasure. And finally, extent i.e. how widely does it cover (see Bentham, 1789).

instant utility and remembered utility. We start with describing general methods and then present respective measurements.

Methods of collecting experienced utility data

The most direct way to measure the individual's experience throughout specific episodes during the day is a real-time survey in its natural setting.[7] There are also methods that collect data on the individual's experience with time delay (e.g. on the next day). One of the best known representatives of these time-delayed methods is the Day Reconstruction Method (DRM), developed by Kahneman et al. (2004a). Time-delayed methods have the disadvantage that inaccuracies, so-called 'memory biases', can arise in the evaluation of experiences. Thereby, certain experienced emotions can be overestimated while others are underestimated (see e.g. Thomas & Diener, 1990). The validity of the DRM compared to the ESM was reviewed and largely confirmed (see e.g. Bylsma et al., 2011; Grube et al., 2008) as well as partially refuted (see e.g. Lucas et al., 2021). Both the ESM and the DRM have in common that they provide information about all activities of a given day. This places a high demand on the length and details of the survey. If only particular episodes are of interest, a third form could be used, the Event Recall Method (ERM). Here, the emotions are queried for only specific episodes of the day, for example, the last time someone was reading a book. Compared to the results for the DRM, no significant differences can be found (see Kahneman et al., 2004b). The advantage of the Event Recall Method is that it targets specific activities without overloading the survey as a whole. The ERM is frequently used in social sciences (see e.g. Eikelenboom et al., 2012; Leidner et al., 2012; Tangney et al., 1996). This method is particularly well suited for our purposes because we explicitly focus on the activities that are related to collecting. Since we do not make comparisons with other activities on the day, there is no need to use the DRM or ESM.

Measurements of experienced utility

To calculate the collector's experienced utility, we need an appropriate measurement. Two indicators are widely used, the so-called 'u-index' and the so-called 'net affect'. The net affect, which was introduced by Kahneman et al. (2004b) and is based on the reported emotions with three positive adjectives (happy, warm/ friendly, enjoying myself) and five negative adjectives (frustrated/annoyed, depressed/blue, hassled/pushed around, worried/anxious, tired). It allows a comparison of the experienced utility between various individuals using the difference of the reported average of positive and negative emotions in a specific activity/episode (see Table 1). The net affect is therefore defined by

$$\mu_j = \frac{\sum_{m=1}^{M} PA_j^m}{M} - \frac{\sum_{n=1}^{N} NA_j^n}{N}, \tag{4}$$

where PA_j includes all positive emotions and NA_j all negative emotions of a person in activity j. In order to calculate the individual's experienced utility, Kahneman et al. (2004b) echo Bentham's notion where utility is defined by the integral of the flow of pleasure and pain. Therefore, they use the calculated net affect (4) and multiply it with the duration of the activity,

$$U_C = t_j \mu_j, \tag{5}$$

where μ_j is the net affect of a person in activity j and t_j is the time spent in activity j. The advantage of using net affect is that all collected information is integrated into one cardinal metric and it is more detailed than the dichotomous nature of the u-index.

[7] A good example for this approach is the Experience Sampling Method (ESM), developed by Larson and Csikszentmihalyi (2014). Study participants are asked to carry a signaling device and a recording device for a certain period of time. The signal device will randomly ask participants to enter the following information into the recording device up to 10 times a day: (a) actual activity engaged in, (b) social interaction, (c) location and (d) positive and negative feelings linked to actual episode.

Table 1
Survey questions to collect data on experienced utility.

How did you feel during this episode?

Please rate each feeling on the scale given. A rating of 0 means that you did not experience that feeling at all. A rating of 6 means that this feeling was a very important part of the experience. Please circle the number between 0 and 6 that best describes how you felt.

	Not at all						Very much
happy	0	1	2	3	4	5	6
frustrated/annoyed	0	1	2	3	4	5	6
depressed/blue	0	1	2	3	4	5	6
hassled/pushed around	0	1	2	3	4	5	6
warm/friendly	0	1	2	3	4	5	6
worried/anxious	0	1	2	3	4	5	6
enjoying myself	0	1	2	3	4	5	6
tired	0	1	2	3	4	5	6

Note: Our survey design is based on Kahneman et al. (2004b) and is translated into German for the survey.

2.2.3. Hybrid utility

Now that we have defined the utility functions for the (pure) investor and the (pure) collector, we turn our attention to the individuals who lie between these two poles. Therefore, we combine the financial utility of the investor (2) with the non-financial utility of the collector (5). The total utility for the group of hybrids is defined by

$$U_H = U_I + U_C = (1-\beta)(E_R + \alpha\frac{1}{2}\sigma_R^2) + \beta t_j \mu_j, \tag{6}$$

where the first part of the equation refers to decision utility and the second part to experienced utility. The variable β represents the utility trade-off parameter. For the (pure) collector the equation reduces to (5) and for the (pure) investor the equation reduces to (2). Consequently, the individual's utility function depends on the relation between financial and non-financial motives for collecting, which necessitates a trade-off between the two components. In specific cases in reality, however, both sides do not have to balance each other out. For example, an obsessive collector (hoarder) might not expect a positive return on investment on the one hand, but also experiences more negative than positive emotions with the collection on the other hand, which would finally result in a negative utility. This could indicate irrational behavior. Through the Eq. (6) we can describe and measure the utility of the investor, the collector and the hybrid, i.e. for all owners of collectibles.

2.3. Hypotheses

To test our non-standard utility function for owners of collectibles, we consider a total of three different types. Based on the motives why they collect, we define the types as follows.

- **Collector:** The collector pursues (primarily) non-financial goals with the acquisition and ownership of collectibles; the foundation and enlargement of the collection are typical in the first place.
- **Hybrid:** Financial and non-financial motives are in balance for the hybrid collector; besides spending time with his collection, he also expects a certain annual return from holding the collection.
- **Investor:** The investor acquires and holds collectibles with the intention of reselling them at a profit; non-financial motives for collecting (e.g. displaying the own collection) are negligible for him.

Using our multi-attribute utility function derived in Section 2.2, we argue that the levels of experienced utility (non-financial) and decision utility (financial) must be different for the respective groups (collector, hybrid and investor). Thus, by demonstrating that the respective types of utility differ in a certain way for the defined groups, we provide evidence for the validity of our non-standard utility function. Therefore,

Table 2
Descriptive statistics — Demographics (incl. collectors, hybrids and investors).

		Owners of collectibles			Control
		Collectors ($n = 242$)	Hybrids ($n = 84$)	Investors ($n = 37$)	Group ($n = 1,637$)
Gender	Female	41.3%	31.0%	43.2%	54.2%
	Male	58.7%	69.0%	56.8%	45.8%
Age	18–24	10.3%	14.3%	18.9%	8.0%
	25–39	28.1%	29.8%	32.4%	19.7%
	40–54	22.7%	23.8%	24.3%	27.9%
	55–65	14.5%	15.5%	5.4%	17.7%
	>65	24.4%	16.7%	18.9%	26.8%
Income	<500	4.1%	8.3%	8.1%	9.3%
(in €)	501–1,000	14.0%	7.1%	16.2%	13.0%
	1,001–2,000	26.0%	21.4%	29.8%	26.0%
	2,001–4,000	38.8%	39.3%	32.4%	38.2%
	>4,000	16.9%	23.8%	13.5%	13.6%
Financial assets	<25,000	42.1%	26.2%	37.8%	58.5%
(in €)	25,001–50,000	17.8%	19.0%	16.2%	16.6%
	50,001–150,000	21.9%	28.6%	21.6%	13.6%
	150,001–400,000	12.0%	16.7%	16.2%	8.2%
	>400,000	6.2%	9.5%	8.1%	3.1%
Educational level	Under High School Degree	53.7%	50.0%	62.2%	57.5%
	High School Degree	14.0%	23.8%	16.2%	16.0%
	Academic Degree	32.2%	26.2%	29.7%	26.5%
Collected Items	Coins	43.8%	48.8%	43.2%	–
(not exhaustive)	Stamps	31.8%	15.5%	21.6%	–
	Watches	24.8%	26.2%	32.4%	–
	Art	20.2%	16.7%	21.7%	–

Note: Summary for all 2,000 individuals participating in the survey, classified into owners and non-owners of collectibles (control group). The owners of collectibles are again separated into investors, hybrids and collectors. Based on the average exchange rate (Jan. 2021) of 1.205 USD per EUR, the income class levels correspond to the following values in USD: 1,205, 2,410, 4,218 and 6,025. The financial asset class levels correspond to the following values in USD: 30,125, 60,250, 180,750 and 482,000.

we form hypotheses for experienced utility on the one hand and for decision utility on the other hand. The following four hypotheses are then tested, based on our unique data set in Section 4.

Experienced Utility

Following our model, experienced utility arises primarily for owners of collectibles with non-financial motives. Accordingly, it can be assumed that experienced utility differs between the three groups. Our first hypothesis is formulated as follows.

H_0^1: *Experienced utility does not differ between the defined groups.*

In addition, we assume that there is a positive relationship between the level of non-financial motives and experienced utility. We assume the highest values for the group of collectors and the lowest values for the group of investors. To test this, we compare the two poles of our sample, namely collectors and investors.

$H_0^{1.1}$: *Collectors do not exhibit higher experienced utility than investors.*

Decision Utility

We also assume that decision utility differs between the respective groups as they are motivated differently from a financial perspective. We put forward the following hypothesis.

H_0^2: *Decision utility does not differ between the defined groups.*

Moreover, we assume that there is a positive relationship between the level of financial motives and decision utility. We assume the highest values for the group of investors and the lowest values for the group of collectors. To test this, we again compare the two poles of our sample, namely investors and collectors.

$H_0^{2.1}$: *Investors do not exhibit higher decision utility than collectors.*

3. Data

Our unique data set is collected by using a self-report questionnaire. This form of data collection allows the accumulation of large amounts of data. General implications can be drawn as the sample is randomly selected. Also, the data collected tend to be more accurate as respondents directly answer the given questions. In addition to the statistical data of the respondents (e.g. age, gender, family status, place of residence, education, occupation, income and wealth), the set also includes data on individual's experienced utility and decision utility, which are analyzed in Section 4.

3.1. Data collection

The data for this study is collected through an online survey. Online surveys conducted by panel companies are becoming increasingly prevalent in current studies.[8] Low survey costs and the ability to reach a huge number of participants are two of the advantages of this method (see e.g. Hays et al., 2015). Our survey is conducted in cooperation with the Toluna Group (https://uk.toluna.com), which is an online data collection group with more than 13.4 million members in 68 countries, focusing on the allocation of market research data. Toluna guarantees a consistently high quality of the panel through various measures (e.g. limitation of the frequency of survey participation) based on the ESOMAR[9] 28 guideline. In addition to Toluna's panel quality control, invalid data sets are excluded by means of trap questions that participants had to answer. Only valid and reliable sets are used for the subsequent analysis. Our survey has been fielded in for

[8] Studies can be found for various fields of science, e.g. Business and Economics (see e.g Jang et al., 2017; Lee et al., 2017; Prince et al., 2016; Selenko et al., 2017) or Psychology (see e.g Dorrough & Glöckner, 2018; Wilton et al., 2020).

[9] The European Society for Opinion and Market Research (ESOMAR) is an internationally active market research association based in Amsterdam.

two weeks in January 2021, with 620,000 panelists within the chosen German panel, where a sample of 2,000 individuals was drawn. Based on the data from the U.S. Census Bureau, the panel is representatively compiled for the German population with respect to age and gender and the restriction that only persons from the age of 18 are interviewed. The questionnaire is checked for content and structural inconsistencies in a pretest with five persons. The questionnaire can be found in Appendix. As the survey is conducted in Germany, the questions are translated accordingly in advance.

3.2. Data summary

A total of 2,000 individuals between 18 and 85 years completed the survey. The average age is 50.1 years. Regarding the gender of the respondents, 49.2 percent are male and 50.8 percent female. The sample can therefore be considered representative in terms of both age and gender. Asking about their collecting activity, 18.2 percent of the respondents (363) indicated that they are actively owning collectibles for collecting and/or investment motives, while 63.9 percent (1,278) collected in the past and 17.9 percent (359) never collected. Additionally, we separate owners of collectibles into investors,[10] hybrids and collectors according to our definition in Section 2. The classification of the defined types is created exclusively by eliciting respondents' motives through self-reports. Table 2 summarizes our survey results. The characteristics examined are gender, age, income, financial assets and educational level. German school degrees are queried and classified according to the American system. By comparing statistics of owner and non-owner of collectibles, the following differences are striking. Owners of collectibles tend to be male (60.9%) and, on average, 4 years younger than the control group. They are also well-educated, nearly one third (30.0%) holds an academic title, compared with only 26.5 percent in the control group. In terms of income and financial assets, owner of collectibles tend to be wealthier than the control group. For example, for owners of collectibles the category of top earners with a net income of more than €4,000 is about 30 percent larger. Furthermore, one in four of the owners of collectibles hold more than €150,000 in assets, while the peer group holds only 11.3 percent. No noticeable differences were found for the characteristics marital status, occupation, and place of residence.

Demographics of the defined subgroups are as follows. Collectors form the largest of all three subgroups, representing two-thirds of the sample. They are more likely male (58.7%) and well-educated. Within the peer groups, most academics can be found among the collectors (32.2%). Collectors tend to have less financial assets in comparison to hybrids and investors, although this does not apply to their net income. Besides coins (43.8%), they collect mainly stamps (31.8%) and watches (24.8%). Hybrids represent the second largest subgroup (23.1%) and are characterized by high incomes and great financial wealth. Nearly one in ten of the hybrids owns assets worth more than €400,000. Similarly, hybrids are well educated, with the highest proportion of college graduates among them (23.8%). It is striking that there is a relatively large number of men in the group (69.0%). They collect mainly coins (48.8%) and watches (26.2%), other areas of collecting are of less interest. Investors tend to be younger than the peer groups (median = 47.6 years). Like the hybrid group, they are characterized by high levels of wealth, although this does not apply to their net income to the same extent. The three most commonly owned items are coins (43.2%), watches (32.2%) and art (21.7%).

[10] In our study, we use the term 'investor' for people who describe themselves as investors. As this is a self-reported categorization, this can lead to biases, as certain attributes that characterize a typical investor are not observed. Some of the respondents who describe themselves as investors are predominantly young, which may explain their lack of experience, but the data suggests a gap in their understanding of traditional investment principles. This may lead to a biased expectation of future returns.

Table 3
Summary Statistics for Experienced Utility.

	All (n = 363)		Collectors (n = 242)		Hybrids (n = 84)		Investors (n = 37)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Net affect	2.93	2.30	3.22	2.22	2.62	2.26	1.80	2.46
– Positive affect	4.43	1.28	4.63	1.24	4.19	1.23	3.74	1.39
– Negative affect	1.50	1.88	1.40	1.97	1.57	1.56	1.94	1.89
Time per day (in hours)	.38	.68	.41	.72	.33	.62	.31	.47
Experienced Utility	1.18	2.94	1.46	3.40	.82	1.79	.22	.66

Note: Summary for all 363 owners of collectibles classified into investors, hybrids and collectors. Net affect is calculated by the average of three positive emotions less the average of five negative emotions. Experienced utility is the result of multiplying net affect and time.

Table 4
Kruskal–Wallis Test: Experienced Utility.

		n	Mean Rank	H	df	p
Experienced Utility	Collector	242	191.45	7.270	2	.026*
	Hybrid	84	170.52			
	Investor	37	146.23			

Note: The sample consists all of 363 owners of collectibles. We define experienced utility as the dependent variable. Test statistic is considered to be asymptotically chi-square distributed.
* p-values that are significant at the 0.05 level.

4. Results

To test our hypotheses, we consider both components of our utility function: a) experienced utility and b) decision utility. The purpose is to prove that both types of utility are significantly different for the defined types of collectors. This allows us to bring evidence for our theoretically constructed collector's utility function.

4.1. Experienced utility

In order to determine the individual's experienced utility, we use the ERM, developed by Kahneman et al. (2004b). Since not all daily activities are of interest to us, we specifically ask about the last activity that was related to the respondent's collectible or collection. In addition to the duration of the specific event, the emotions that were felt during the event are queried. A total of three positive emotions and five negative emotions are used, which are asked on a 7-point Likert scale. When calculating the net affect, a 7-point Likert scale is commonly used (see e.g. Connolly, 2012; Gimenez-Nadal & Molina, 2015; Kahneman et al., 2004b). By subtracting the average of the negative adjectives from the positive adjectives we get the net affect. Table 3 shows the mean and standard deviation for the net affect (incl. positive and negative affect), the duration and the experienced utility, each for the whole sample and separately for collectors, hybrids and investors. As we can already see, activities related to collectibles exhibit an average net affect of 2.93. This result goes in line with the findings of Gimenez-Nadal and Molina (2015), who state a net affect of 3.27 for general at-home leisure activities. Considering the individual groups, collectors exhibit the highest experienced utility, followed by hybrids and investors. This results especially from the differences in the average net affect within the respective groups, rather than from the respective duration. In order to test our hypothesis H_0^1, an analysis of variance is carried out.

We perform the Kruskal–Wallis test, which examines whether independent samples originate from a common population with respect to an at least ordinal-scaled variable. The following assumptions apply to the test. First, the sample is drawn randomly from the population. Second, the observations are independent of each other. Finally, the dependent variable is at least ordinal-scaled. The assumption of normally distributed responses is not necessary (see Kruskal & Wallis, 1952). Table 4 shows the results of the test. Given the asymptotic significance of .026, it can be assumed that there are differences regarding the

Table 5
Pairwise comparison: Experienced Utility.

	Test-statistic	Std. Error Std.	Std. Test-statistic	Sig (*p*-value)	Adj. Sig (*p*-value)
Investor vs. Collector	45.225	18.522	2.442	.015	.044*
Investor vs. Hybrid	24.288	20.704	1.173	.241	.722
Collector vs. Hybrid	20.937	13.288	1.576	.115	.345

* Adjusted p-values that are significant at the 0.05 level.

Table 6
Summary Statistics for Decision Utility.

	All (n = 363)		Collectors (n = 242)		Hybrids (n = 84)		Investors (n = 37)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
E(R)	.04	.72	−.02	.63	.05	.80	.36	.96
$E(R_{min})$	−.18	.54	−.19	.56	−.21	.46	−.13	.13
$E(R_{max})$	.27	1.01	.21	.96	.32	1.01	.63	1.26
Perceived risk (σ)	.35	.49	.31	.44	.36	.53	.54	.65
Perceived risk aversion (α)	−.18	.25	−.21	.26	−.12	.20	−.11	.27
Decision Utility	.07	.80	.01	.67	.08	.87	.46	1.23

Note: Summary for all 363 owners of collectibles classified into investors, hybrids and collectors. Perceived risk aversion (α) is based on self-reported data and is translated into quantitative proxies. Perceived risk or standard deviation (σ) is based on the self-reported expected value of the given collection/ collectible, as well as the maximum and minimum individual's expected value in one year.

central tendencies of the groups. Therefore, we reject our hypothesis H_0^1. This is already a first indication that the experienced utility varies for different types of collectors. However, this test does not allow us to determine the extent to which the groups differ from one another. So, we perform one additional post-hoc test to test our hypothesis $H_0^{1.1}$ and use the Dunn–Bonferroni test (see Dunn, 1964). Table 5 summarizes the results. Pairwise comparison reveals significant p-value for one set of groups. Therefore, we reject hypothesis $H_0^{1.1}$. Our findings reveal that collectors have a significantly higher experienced utility than investors, which is consistent with our non-standard utility function. In contrast, no significant difference can be found between the group pairs comprising the hybrid type.

4.2. Decision utility

In order to determine the individuals' decision utility, we ask for the individuals' expected return for the collection or collectible on an annual basis. In addition, we ask for the individuals' maximum and minimum expected value. In the survey, the respondents assume a current value of their collection of €1000. In order to measure the risk aversion of the individual, we use self-reported attitudes towards financial risk. Using a 5-point Likert scale, we ask about the respondents' willingness to take financial risk, starting with "no risk at all" and ending with "full risk" and recoded it. According to Ding et al. (2010) and Dohmen et al. (2011), simple survey questions are valid approximations for the individual's risk behavior. The calculated individual's perceived risk is derived from the expected maximum and minimum return. Table 6 shows the mean and standard deviation. The average expected return for collectibles is 4 percent, with notable differences between the groups. While, on the one hand, collectors on average expect a negative performance of 2 percent, investors, on the other hand, believe in an increase of 36 percent per year.

As this reported observation is rather high as compared to historical returns for collectibles,[11] we discuss the context of our 2021 survey in more detail in the following.

Table 7
Kruskal–Wallis Test: Decision Utility.

		n	Mean Rank	H	df	p
Decision Utility	Collector	242	191.45	7.388	2	.025*
	Hybrid	84	187.07			
	Investor	37	223.34			

Note: The sample consists all of 363 owners of collectibles. We define decision utility as the dependent variable. Test statistic is considered to be asymptotically chi-square distributed.
* p-values that are significant at the 0.05 level.

Table 8
Pairwise comparison: Decision Utility.

	Test-statistic	Std. Error Std.	Std. Test-statistic	Sig (*p*-value)	Adj. Sig (*p*-value)
Investor vs. Collector	−49.416	18.503	−2.671	.008	.023*
Investor vs. Hybrid	−13.144	13.274	−.990	.322	.966
Collector vs. Hybrid	−36.272	20.682	−1.754	.079	.238

* Adjusted p-values that are significant at the 0.05 level.

(i) **Market environment:** In recent years, the prevailing low interest rate environment led to a search for yield among (retail) investors. Alternative investments, including collectibles, gained increased attention (Kräussl et al., 2017). During such periods of low interest rates, investors may develop exaggerated or unrealistic expectations, making their anticipated returns less representative of the long run equilibrium expected returns in traditional asset classes. This aspect may be strengthened by the fact that some collectibles have outperformed the market in recent years, see e.g. Martin (2016) for vintage cars, who reports an annual return of 18.1 percent covering the period from 2007 to 2016.

(ii) **Digital collectibles:** Our survey respondents at least in parts were affected by the upcoming field of digital collectibles. These collectibles exhibit a high-risk profile as compared to traditional investments (Kong & Lin, 2021). According to a study by Mazur (2021), the performance of selected NFTs on a market-adjusted basis for 2021 was 83.0 percent with a holding period of about 300 days. Of these, half of the NFTs with positive returns were over 200 percent. In our dataset, 6 out of 36 investors report owning digital collectibles. Their reported average annual expected return for their collections is 105.8 percent, a factor of 4.7 higher than the rest of our collectors. When we only consider the 30 collectors of our sample who do not engage in digital collectibles, the expected annual return decreases from 35.9 to 22.3 percent.

(iii) **Outlying Expectations:** Our survey data set contains a relevant outlier. One respondent reports an expected return of 350 percent for his collection, which is clearly far above all other reported expectations. A closer analysis of the respondent reveals him to be a collector of NFTs. Given our discussion in the two points above, it appears that not only expectations are elevated due to the investment environment at the time our survey took place, but also due to single observations that relate to collectors of digital assets. While it is obvious that these expectations are economically unsound, individual respondents may have formed them in the face of recent large gains in their collections. In case we consider our data set without the main outlier, the average expected return is reduced to 27.4 percent.

[11] Many thanks to the editor for pointing this out. In a detailed meta-study, Burton and Jacobsen (1999) come to the conclusion that the returns of different collectibles differ significantly in some cases. The highest nominal annual return, for example, is found in a study by Mok et al. (1993) which reports a return of 52.9 percent for modern Chinese art for the period 1980–1990. There are also studies with a negative return. If we consider the three examined indices of Sotheby's, Salomon Brothers and BritRail Fund, the nominal annual return is between 11 and 14 percent. Compared to equities, however, these returns are relatively low, as shown by Dimson and Spaenjers (2014).

Table 9
Binary logistic regression analysis for utility on collecting motives.

	β	S.E.	Wald	df	p	exp(β)	95% C.I. exp(β)	
							Lower	Upper
A: Demographic criteria								
Age	−.014	.012	1.293	1	.255	.986	.963	1.010
Gender (ref: Female)	.317	.419	.574	1	.449	1.373	.604	3.121
Income (ref: <500)			2.680	4	.613			
(1): 501–1,000	−.437	.873	.250	1	.617	.646	.117	3.575
(2): 1,001–2,000	−.709	.802	.781	1	.377	.492	.102	2.370
(3): 2,001–4,000	−.976	.834	1.370	1	.242	.377	.073	1.932
(4): >4,000	−1.471	.984	2.237	1	.135	.230	.033	1.579
Financial Assets (ref: <25,000)			2.591	4	.628			
(1): 25,001–50,000	−.161	.594	.074	1	.786	.851	.266	2.724
(2): 50,001–150,000	.407	.554	.542	1	.462	1.503	.508	4.448
(3): 150,501–400,000	.874	.642	1.857	1	.173	2.397	.682	8.432
(4): >400,000	.541	.890	.370	1	.543	1.718	.300	9.834
Education (ref: <High School)			.616	2	.735			
(1): High School Degree	−.315	.585	.289	1	.591	.730	.232	2.300
(2): Academic Degree	−.341	.487	.492	1	.483	.711	.274	1.845
χ^2(7.580)					.817			
Nagelkerke R^2			.049					
B: Utility								
Experienced Utility	−.619*	.263	5.528	1	.019	.538	.321	.902
Decision Utility	.829*	.253	10.755	1	.001	2.290	1.396	3.758
χ^2(30.826)					.006			
Nagelkerke R^2			.193					

Notes:
1. A positive logarithmic coefficient (β) shows that an increase in the value of the independent variable is linked to an increase in the likelihood that the person is a investor. A negative value means the opposite.
* Standardized Beta estimates that are significant at 0.05.

In order to test our hypothesis H_0^2, an analysis of variance is carried out. Again, we perform the Kruskal–Wallis test. The results of the test are presented in Table 7.

Given the asymptotic significance of .025, it can be assumed that there are differences regarding the central tendencies of the groups. Therefore, we reject our hypothesis H_0^2. To find out which pairs of groups differ, we again perform the Dunn–Bonferroni test. The results are presented in Table 8. A pairwise comparison reveals significant p-value for one set of groups. Therefore, we reject hypothesis $H_0^{2.1}$. Investors have significantly higher decision utility than collectors, which is consistent with our theoretical considerations. No statistically significant differences are found for the remaining two pairs. It can therefore be stated that there are significant differences between collectors and investors in terms of both decision utility and experienced utility.

4.3. Collector and investor

The previous results suggest a difference in the received type of utility between collectors and investors. To evaluate the robustness of our results, we perform a binary logit regression analysis. Furthermore, we integrate demographic characteristics as control variables, in order to account for confounding effects in the model. The dependent variable refers to group membership, with 0 representing the group of collectors and 1 representing the group of investors. Age, gender, financial wealth and education are included in the model as control variables. The regression analysis is performed stepwise, the first block includes the control variables (demographics) and the second block involves the independent variables (decision and experienced utility). Table 9 summarizes the results of the model. To test whether the regression model is significant, a chi-square test is performed. The results reveal that the model as a whole is significant ($\chi^2 = 30.826, p = .006$), while a model only consisting of the control variables would not be significant ($\chi^2 = 7.58, p = .817$). In order to see if the respective regression coefficients (betas) are also significant, a Wald test is performed for each of the regression coefficients. While all coefficients of the control variables are not significant, the coefficients of the two independent variables are significant. If the experienced utility increases by one unit, the relative probability that the respective person belongs to the group of investors decreases by 46.2 percent. In contrast, as decision utility increases, the relative probability that the individual belongs to the group of investors increases by 129.0 percent. We compute the effect size using Cohen's f^2, which is 0.24 and represents a medium effect size (see Cohen, 1988, 1992). Thus, the type of utility associated with owning a collection can serve as a predictor for the collector's motive.

4.4. Trade-off between experienced utility and decision utility

The question that arises is how to evaluate the trade-off between the two types of utility. Assuming that the total utility of the bivariate function is equal, the experienced utility decreases as the decision utility increases, and vice versa. This trade-off can be calculated using Eq. (6), which is presented in Section 2.2. To determine β, we use the mean values for both utility types from the group of collectors (U_I = 0.01, U_C = 1.46) and the group of investors (U_I = 0.46, U_C = 0.22). Assuming that the total utility is the same for both groups, we compute a β of 0.36. The trade-off takes place between the financial and non-financial motives and thus helps to explain why owners of collectibles behave accordingly. However, the trade-off parameter β is not constant within specific clusters, such as age or gender. We calculate a β of 0.54 for the female respondents on average, whereas 0.33 for the males. We therefore assume that the individual weighting of the two types of utility depends on additional factors. As beta decreases, the individual expects a comparatively higher financial payoff, and vice versa. In simple terms, the coefficient beta indicates how much an individual need to be compensated for giving up financial returns in order to obtain one more unit of happiness.

5. Conclusion

Collectibles as financial assets are increasingly finding their way into the portfolios of private and institutional investors.[12] This leads to the question whether collectibles should be treated as an asset class in the same way as traditional forms of investment, i.e. such as bonds or stocks. Our work underlines that this is very probably not the case. While a number of studies deals with the performance of various types of collectibles including art, only a few deal with the specifics of the utility that is provided by collecting.

To our knowledge, our study is first to analyze collector utility based on a hedonistic approach. For this purpose, we use a unique data set including 2,000 respondents to prove that specific asset classes, in our case collectibles, yield non-financial utility. The implications of our results suggest that the combination of financial and non-financial aspects in a utility function leads to a more general and accurate result when determining collectors' utility. We argue, that in addition to the financial return, the collector receives an emotional return, which can be seen as the compensation for a possible underperformance of the collectible. By including a non-financial utility, we believe that the accuracy of existing asset pricing models can be improved. Our additive approach is a first indicative approximation. Although our utility function is primarily developed for the asset class of collectibles, it could also apply to other assets classes or investments. Our approach may help to better explain the behavior of some of the market participants also in those cases.

Funding

This research did not receive any specific grant from funding agencies in public, commercial, or not-for-profit sectors.

Declaration of competing interest

None.

Appendix

Preliminary note The following questions relate to the activity of collecting items (e.g. art, books, coins, stamps, wine, etc.) as a hobby or/and investment. The mere accumulation of items without the intention to collect them does not fall under this definition.

Question 1: Which of the following statements applies to you? (Single Choice)

- I currently collect
- I have collected in the past
- I have never collected

Question 2: What do you collect or have you collected? (Multiple Choice)

- Coins
- Stamps
- Books
- Watches
- Art
- Antiques
- Miniature models
- Wine/ Liquors
- Knickknacks
- Puppets
- Toys
- Minerals
- Classic cars
- Digital collectibles
- Other

Question 3: You have indicated that you collect in the listed areas. Now please tick your main collection area from question 2. (Single Choice)

Question 4: Which of the following statements applies to you? (Single Choice)

- I see myself as a pure collector, a possible increase in value of the collection plays no role for me
- I see myself more as a collector, a possible increase in value of the collection plays a subordinate role for me
- I see myself as a collector as well as an investor in a balanced way
- I see myself more as an investor, the investment and expansion of the collection plays a subordinate role for me
- I see myself as a pure investor, the creation and expansion of the collection plays no role for me

Question 5: How frequently do you spend time with your collection on average and how much time do you spend on it? (Single Choice)

- daily, [in hours]
- weekly, [in hours]
- monthly, [in hours]
- annual, [in hours]

Question 6: How did you feel the last time you spent time with your collection? Please rate each feeling on the scale given. A rating of 0 means that you did not experience that feeling at all. A rating of 6 means that this feeling was a very important part of the experience.

- happy
- frustrated/annoyed
- depressed/blue
- hassled/pushed around
- warm/friendly
- worried/anxious
- enjoying myself
- tired

Question 7: Assume that your collection currently has a value of €1,000. What realistic value do you expect this collection to have in a year (in EUR)? (Precondition: The content of the collection remains the same)

Question 8: Assume that your collection currently has a value of €1,000. What minimum value do you expect this collection to have in a year (in EUR)? (Precondition: The content of the collection remains the same)

Question 9: Assume that your collection currently has a value of value of €1,000. What maximum value do you expect this collection to have in a year (in EUR)? (Precondition: The content of the collection remains the same)

Question 10: How would you rate your risk tolerance in terms of investing? (Single Choice)

- risk averse (very low risk)
- conservative (low risk)
- neutral (moderate risk)

[12] Given the highly heterogeneous and non-transparent environment, it is difficult to obtain robust data on the market size. As an example, the 2020 Knight Frank Wealth Report (www.knightfrank.com) estimates the value of collectibles in the portfolios of ultra high net worth individuals (net wealth US$30 million or more) to be approximately 5 percent.

- risk seeking (high risk)
- speculative (very high risk)

Reported demographics

- Age
- Gender
- Education
- Income
- Wealth

Note: The questionnaire includes further characteristics, such as marital status, but these are not part of the study and are therefore not listed here.

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