

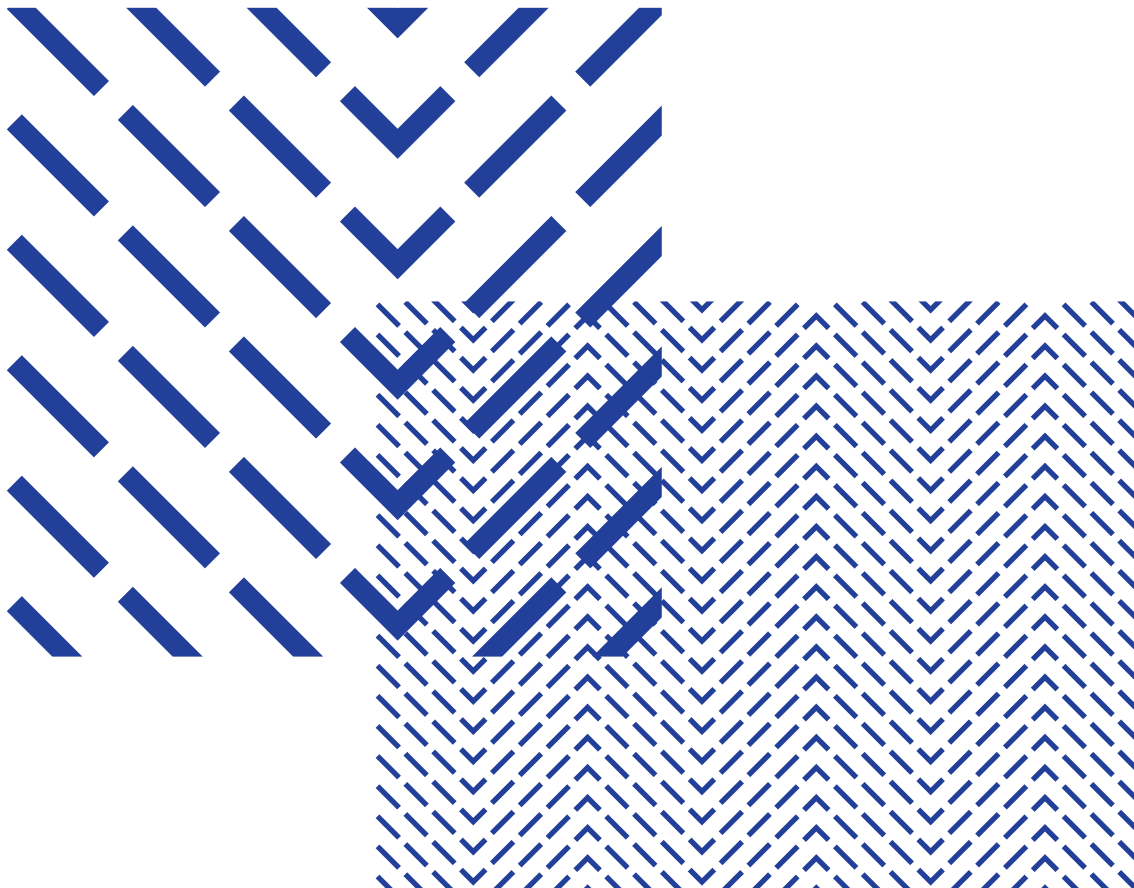


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Klaus-Ulrich Remmerbach | Iván David Aranzales Acero

# The psychology of money

*Impacts of financial constraints and the digital economy*





*Is our consumption behavior rational? Due to their limited available rationality („bounded rationality“), humans resort to cognitive abbreviation strategies (known as heuristics) to make decisions. Based on insights from psychology and other social sciences, „Behavioral Economics“ attempts to improve the reality of traditional economic theories.*

*If the consumer does not act purely rationally, which factors influence his behavior? What are the consequences? Following theoretical foundations the second part addresses the impact of financial constraints on consumer behavior. The last part deals with basic effects of the digital economy on consumer behavior.*



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## The psychology of money

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**Klaus-Ulrich Remmerbach**  
**Iván David Aranzales Acero**

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Klaus-Ulrich Remmerbach and Iván David Aranzales Acero

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## Management Summary

Is our consumption behavior rational?

The Homo Oeconomicus represents the main concept of the classical economy.<sup>1</sup> He is rational, maximizes his self-interest, is free of emotions and does not make any mistakes in the information recording and processing.

Due to their limited available rationality ("bounded rationality"), humans resort to cognitive abbreviation strategies (known as heuristics) to make decisions.<sup>2</sup> In the process, factors are considered, which should be irrelevant according to the economic theory. Richard Thaler calls them "supposedly irrelevant factors". These factors, however, are in fact not irrelevant; On the contrary, they can repeatedly predict human behavior.

Based on insights from psychology and other social sciences, "Behavioral Economics" attempts to improve the reality of traditional economic theories.

If the consumer does not act purely rationally, which factors influence his behavior? What are the consequences?

We will first present some basic components of the "psychology of money". You will see that this (empirical and descriptive) theory refutes in many respects the rational construct of the Homo Oeconomicus.

Subsequently, the consequences of the psychology of money will be applied to two particularly striking aspects of consumer behavior.

The first aspect concerns the impact of financial constraints on consumer behavior. People experiencing financial constraints face the challenge of having to be more disciplined with their spending than others. However, their rationality, as with all human beings, is also limited. Within the scope of this Bachelor thesis, we examine the question whether or not the goal to rid oneself of these financial constraints is partly prevented through the psychology of money.

The second aspect deals with some basic effects of the digital economy on consumer behavior. Through digitalization, the way in which consumption "occurs" is changing: Cash will be partly substituted, products will be increasingly bought at home or they will be automatically ordered through intelligent machines.

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<sup>1</sup> Here and in the following: Beck 2014 p. 1

<sup>2</sup> Remmerbach 2016, pp. 237ff.; Beck 2014, pp. 2f



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## List of abbreviations

B2B	Business to Business
IoT	Internet of things
NFC	Near field communication
QR	Quick response
RFID	Radio-frequency identification
WLAN	Wireless local area network

# 1 Theoretical background

The moment we accept that humans do not act completely rational, we will stop assuming that people always make the best decisions (D. Kahneman). In experimental economic research (especially decision making and game theory) experiments are carried out (controlled laboratory experiments, field experiments and simulations) in order to examine theories or to discover new patterns. These are referred to as behavior patterns in behavioral economics. When these patterns are predictable, reproducible and significant, they represent the real decision-making behavior of "normal people". These behavioral patterns are error-prone and often lead to so-called "bugs".

In this chapter, we will introduce some basic insights from behavioral economics and thus familiarize ourselves with the theoretical foundations of the "psychology of money".

## 1.1 Relativity

Are € 5 = € 5?

According to the rational economic model, the answer is, of course, yes.

However, the following example shows another perspective:<sup>3</sup>

- Imagine you want to buy a calculator for \$ 15. The store clerk informs you that you can get the same calculator for \$ 10 if you travel to the next store 20 minutes down the road. Would you drive to the next store? Now imagine that the calculator costs \$ 125 and the next store sells it for \$ 120. Would you still drive to it?

While 68% of the respondents were willing to save \$ 5 on a \$ 15 calculator, only 29% would do the same for the \$ 125 one.<sup>4</sup> In both cases you could save five dollars through the same effort.

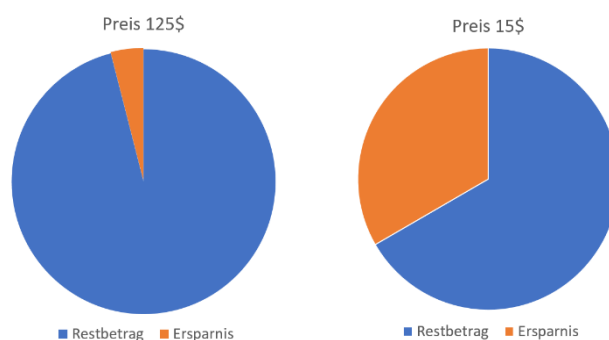


Figure 1: Visual representation of the relativity of money<sup>5</sup>

<sup>3</sup> Here and in the following: Tversky; Kahneman 1981, p. 457

<sup>4</sup> Here and in the following: Tversky; Kahneman 1981, p. 457

<sup>5</sup> Own diagram in reference to Tversky; Kahneman 1981, p. 457

What is the explanation for this irrational behavior?

“We don't have an internal value meter that tells us how much things are worth. Rather, we focus on the relative advantage of one thing over another, and estimate value accordingly.”<sup>6</sup>

For example, it is expected (and accepted; one of the fundamental correlations in marketing) that a car with a six-cylinder is more expensive than one with a four-cylinder.<sup>7</sup>

In an experiment on the relativity of the judgment, students were asked how much money they would spend on a sunny day at the beach for their favorite beer.<sup>8</sup> They should imagine that a friend would bring the beer for them. If the selling price was greater than the price stated, this friend would not buy the beer. In the experiment, the students were divided into two groups. The first group was told that the beer would be bought from a supermarket. The second group thought the beer would be bought in a hotel bar. Although the consumer experience remains the same (the same beer is drunk on the same beach), the first group was willing to spend \$ 4.10, while the second would have spent up to \$ 7.25 on average.

Why does it matter where the beer is bought?<sup>9</sup> On the one hand, people judge a product according to the utility it provides. On the other hand, they also value the quality of the transaction. While a high price tag is expected at a hotel bar, the same price would cause a cognitive dissonance at the supermarket (e.g. in the form of outrage). However, from a rational point of view, it should be irrelevant where the beer is bought.

This can lead to further irrational behaviors. For example, a manager who earns € 300,000 / year feels unhappy about his salary because his colleagues earn more (social comparison = relativity of income evaluation). This inconsistency also manifests itself when consumers are trying to save 25 cents for a can of soup, but are willing to spend an additional € 3,000 on the leather seats of a € 25,000 car.<sup>10</sup>

## 1.2 Anchoring effect

Anchoring is the phenomenon of people estimating unknown values, based on some initial values, even if these initial values have nothing to do with those that need to be estimated.<sup>11</sup>

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6 Ariely Predictably Irrational p. 2

7 Ariely, 2015, p. 36

8 Here and in the following: Thaler 2015, pp. 59f

9 Here and in the following: Thaler 2015, pp. 60f

10 Ariely 2015, p. 56

11 Beck 2014, p. 145; Remmerbach 2016, pp. 246ff.

Experiment: Subjects were asked to turn a wheel of fortune.<sup>12</sup> This wheel was manipulated so that either a "10" or "65" would appear. Then, they were asked what the percentage of African countries among the members of the United Nations was. As a result, the assessments of the subjects who had rotated (10) and [65] at the beginning were respectively (25%) and [45%].

This anchoring effect also comes into effect with real money.<sup>13</sup> Participants were asked how much money they are willing to donate annually to protect 50,000 seabirds on the American Pacific coast from environmental damage. Some participants were given an anchor of \$ 5, for others it was \$ 400. This was done by telling the respective group, for example, "Would you be willing to pay \$5...",<sup>14</sup> In the end, the average donation was \$ 20 for the first group and \$ 143 for the second group. If no anchor was set (control group) the participants wanted to donate an average of \$ 64.

### 1.3 Loss aversion

In the classical economy model, people's decisions under uncertainty are determined by the expected-utility-theory<sup>15</sup>, which states that the possible results are multiplied by their probability.<sup>16</sup> For a coin toss with the 50:50 probability of winning or losing 1 €, the expected value equals zero.  $EV = 1 \text{ €} * (0,5) - 1 \text{ €} * (0,5) = 0$

Does this theory represent reality? The Prospect Theory of Tversky and Kahneman offers a different point of view. It is based on the following three principles:<sup>17</sup>

- Point of reference: Decisions are made with respect to a reference point. For example, someone evaluates his salary based on the increases in his colleagues' salaries. Above this reference point (others' salaries) is the profit area. On the other hand, a raise below the reference point appears to be a loss.
- Decreasing sensitivity: the difference between € 900 and € 1,000 "feels" smaller than the difference between € 100 and € 200.
- Loss aversion: The weight of losses is twice as high compared to gains of the same amount.

<sup>12</sup> Here and in the following: Kahneman 2015, p. 152

<sup>13</sup> Here and in the following: Kahneman 2016, p. 158

<sup>14</sup> Kahneman 2011, p. 123

<sup>15</sup> Remmerbach 2016, pp. 201ff.

<sup>16</sup> Here and in the following: Beck, 2014, p. 102

<sup>17</sup> Here and in the following: Kahneman, 2015, pp. 346f; Remmerbach 2016, pp. 209ff.

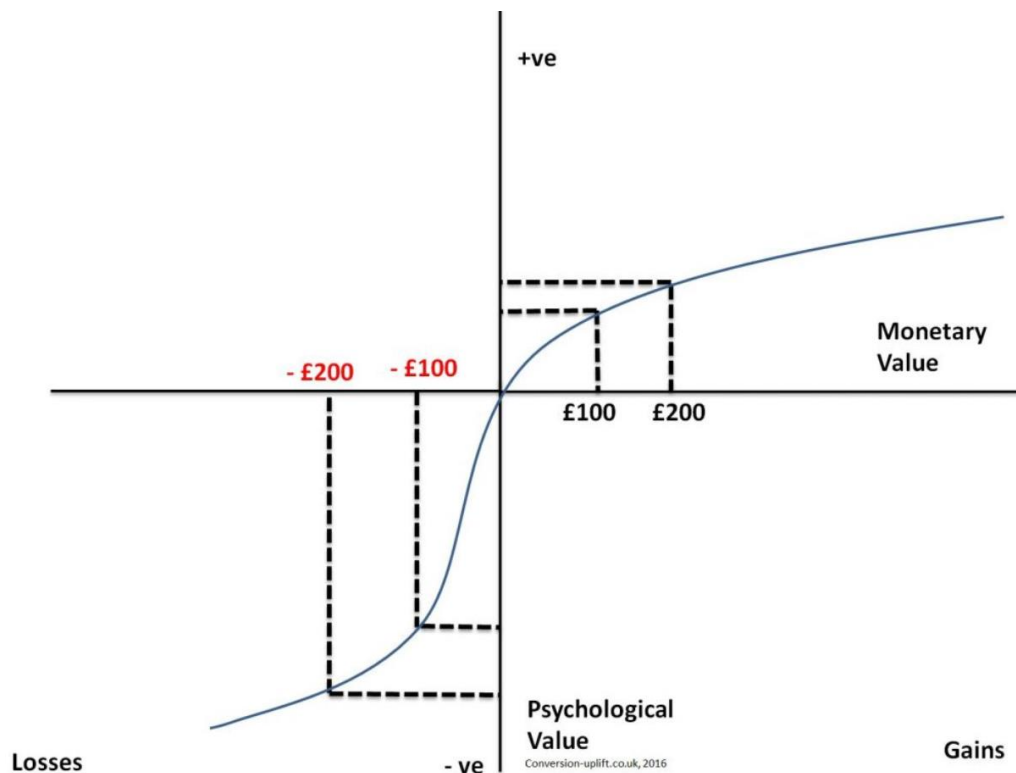


Figure 2: Value function prospect theory<sup>18</sup>

The following example puts these principles into practice:

- “In addition to whatever you own, you have been given \$ 1,000. You are now asked to choose one of these options: 50% chance to win \$ 1,000 OR get \$ 500 for sure
- [...] In addition to whatever you own, you have been given \$ 2,000. You are now asked to choose one of these options: 50% chance to lose \$ 1,000 OR lose \$ 500 for sure<sup>19</sup>

Rationally assessed, both lotteries are identical.<sup>20</sup> In both questions, the participant has the choice between a secure profit of \$ 1,500 or a 50:50 chance to win either \$ 2,000 or merely \$ 1,000. Nevertheless, most of the participants on the first question would take the additional \$ 500 (security), while in the second case most would take the risk.

<sup>18</sup> Graphical representation of the Prospect Theory. The x axis represents the real (objective) money amount. The y axis represents the perceived (subjective) value. <http://www.conversion-uplift.co.uk/wp-content/uploads/2016/11/Prospect-Theory-1024x762.jpg> , retrieved on 23.11.2017

<sup>19</sup> Kahneman 2011, pp. 279

<sup>20</sup> Here and in the following: Kahneman 2016, p. 345

For the first question, the reference point is \$ 1,000, while the one in the second is \$ 2,000.<sup>21</sup> If the reference point is \$ 1,000, an additional \$ 500 will create a positive feeling. Additional \$ 1,000 are, of course, better but, psychologically, not worth much more than \$ 500. If, on the other hand, the reference point is set at \$ 2,000, a \$ 500 loss weighs quite negatively. For the possibility of not losing anything, the participants take the risk of losing up to \$ 1,000.

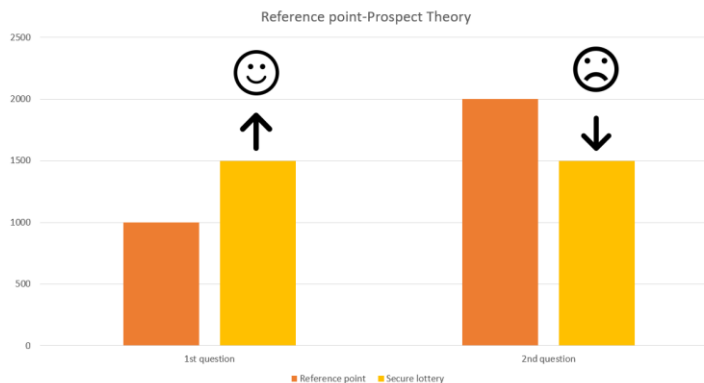


Figure 3: Different reference points<sup>22</sup>

### 1.3.1 Loss aversion's consequences

A lottery, with 50 to 50 odds of losing \$ 100 or winning \$ 150 will be rejected by most people.<sup>23</sup> Although \$ 150 is more than \$ 100, fear (aversion) is greater than hope. In order for the majority of people to take the risk and accept the lottery, they demand about \$ 200, double the amount of the possible loss. This is how alternatives, which should be rationally attractive, are rejected in order to avoid losses.

However, people behave very riskily when they are in the loss area.<sup>24</sup> This is especially true when the decision can get the person out of the minus area. Someone who, for example, just lost € 100 in a horse bet is attracted to the idea of betting € 2 50 to 1. This would give him the chance to recover what he lost. But as a matter of fact, there is a very high chance to provoke even more losses and "throw good money after bad" (known as the sunk cost bias).

<sup>21</sup> Here and in the following: Kahneman 2016, pp. 345ff

<sup>22</sup> Own diagramm in reference to Kahneman 2016, pp. 345ff. Here it can be seen that the secure option (marked in yellow) is worth + \$1.500 in both cases. Yet, this alternative is perceived differently, depending on the reference point.

<sup>23</sup> Here and in the following: Kahneman 2016, pp. 348f

<sup>24</sup> Thaler 2015, p. 80

The loss aversion leads people to take irrationally high risks to compensate for already incurred losses.

### 1.3.2 Which factors have an influence on loss aversion?

Loss aversion can be detected neurologically.<sup>25</sup> It is part of human nature. In an experiment the participants were analyzed using functional magnetic resonance imaging while they played lotteries where they could actually earn or lose real money.<sup>26</sup> In the experiment the recorded loss aversion coefficient was 1.8922, close to the coefficient proposed by the Prospect Theory. In addition, they discovered a correlation between loss aversion and the gray matter in the insula, a brain region associated with feelings of pain and anger.

Interestingly, the culture of a country affects the intensity of loss aversion.<sup>27</sup> According to the classic cultural dimensions of Hofstede (power distance, individualism, masculinity and uncertainty avoidance), 53 countries were analyzed. There is a positive correlation between loss aversion and power distance, individualism and masculinity. The correlation is stronger in societies with high masculine values. The loss aversion is the highest in Eastern European countries.

## 1.4 Pain of Payment

While consumption (hopefully) brings people a desired pleasure, this is diminished by the thought of costs that this consumption generates.<sup>28</sup> When we pay, we feel psychological pain, known as the pain of payment.<sup>29</sup> It is the unpleasant feeling associated with giving away your hard-earned money.

With the help of functional magnetic resonance imaging, it was possible to localize which brain regions are responsible for the pain of payment.<sup>30</sup> Through these investigations, a correlation between price level and the pain of payment was found. This pain is affective in nature.

Pain of an affective nature occurs both after physical pain (e.g., after an electric shock) and during psychological pain (e.g., love affliction or social isolation).<sup>31</sup>

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25 Remmerbach 2016, pp. 49ff.

26 Here and in the following: Markett et al. 2016, pp. 174f

27 Here and in the following: Wang et al. 2017, pp. 11ff

28 Prelec; Loewenstein 1998, p. 5

29 Ariely 2015, p. 327

30 Here and in the following: Mazar et al. 2016, pp. 8ff

31 Mazar et al. 2016, p. 7f

Although the pain of payment reduces the enjoyment of an activity, there are circumstances in which a high pain of payment entails advantages.<sup>32</sup> This is the case, in our context, if a person wants better control over his expenditures. How much the pain of payment is felt depends on many factors. The most important

- “Timing“,
- “Coupling of payment and product / service“,
- “Payment method“,
- “Social support“ and
- “Hedonism versus utility“.

#### 1.4.1 Timing

In a survey participants were asked which of the following two payment options they would prefer for a \$ 1,200 vacation.<sup>33</sup> Either \$ 200 / month six months in advance or \$ 200 / month six months after the holiday. The majority decided to pay in advance; Despite a potential interest loss, which was around \$ 50 at the time of the survey.

Clearly timing plays a role.

Prelec and Loewenstein propose the concept of "Prospective Accounting".<sup>34</sup> This concept indicates that past events are depreciated and only remaining benefits and payments are recorded. The prepayment allows people to enjoy their holidays as if they were free of charge. If the payment takes place after the vacation, only the "irritating" payment remains.

Prepayments occurs in a variety of ways in everyday life.<sup>35</sup> When customers of a casino convert their money into "chips" a prepayment takes place. Other examples can be seen at certain resorts or clubs where, for example, drinks are bought through tokens.

A prepayment can also take place mentally by reserving a certain budget.<sup>36</sup> For example, a monthly budget can be "allocated" for dinner in trendy restaurants, so that this pleasure is not reduced by the pain of payment.<sup>37</sup>

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32 Here and in the following: <http://danariely.com/2013/02/05/the-pain-of-paying/>, retrieved on 02.05.2017

33 Here and in the following: Prelec; Loewenstein 1998, p. 6

34 Here and in the following: Prelec; Loewenstein 1998, p. 10

35 Here and in the following: Prelec; Loewenstein 1998, p. 19

36 Prelec; Loewenstein 1998, pp. 19f

37 Based on Prelec; Loewenstein 1998, p. 20



Furthermore, fixed prices can be used to separate consumption from payment.<sup>38</sup> For example, people would rather pay a fixed price for the use of a sports club instead of paying a certain price per hour for a tennis court – even if at the end use and costs remain the same.

In an experiment Dan Ariely tested the effect of timing.<sup>39</sup> The subjects were paid \$ 10 for their participation. They had to spend a certain time in front of a computer. They were allowed to read free articles about culture, which were, however, purposefully quite boring. They were also allowed to read news, scientific articles, or cartoons (which were more interesting than the culture articles). However, these were not for free; they had to pay between 0.5 and 3 cents for each article. The participants had to either pay directly (every time they had to approve the payment), pay afterwards (the total sum was deducted at the end of the test) or prepay (to buy an article, they first had to deposit money into an electronic wallet). Most of the money was spent by the participants who had to prepay, the group of people paying afterwards came second, and the group of people who had to pay immediately spent the least amount of money.

Ariely offers a concrete suggestion, based on the timing effect, to separate pleasure and payment in an everyday situation, which is familiar to all of us.<sup>40</sup> If a group of friends meet regularly to go out to eat, only one person should pay for all at a given time. Result: on most evenings, the guests will feel the food is free of charge for them. Only occasionally it's their turn to pay for all. As expected in the experiments, the total sum on the one evening is significantly higher compared to an amount divided according to what everyone ordered. However, due to the decreasing sensitivity<sup>41</sup>, the entire pain of payment is the lowest in the long term.

#### 1.4.2 Coupling of payment and product / service

A single payment for a single product or service results in a more intensively perceived connection between the two. Hence, the pain of payment increases.<sup>42</sup> But there are also many cases where this connection between payment and goods / services is less transparent. One example are all-inclusive packages. In this cases, various activities are offered for a single total price; none of the singular activities are solely responsible for the entire sum. The same effect also occurs with the use of credit cards, since we also see here, no single purchase is responsible for the entire bill at the end of the month.

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38 Here and in the following: Prelec; Loewenstein, p. 19

39 Here and in the following: Ariely; Silva 2002, pp. 15ff

40 Here and in the following: Ariely 2008, pp. 326ff

41 Remmerbach 2016, pp. 220

42 Prelec; Loewenstein 1998, p. 22

### 1.4.3 Payment method



Figure 4: Different payment methods<sup>43</sup>

Recent studies indicate that the pain of payment is significantly influenced by the payment method.

“[...] using a different payment form (other than legal tender) may seem like play money or ‘monopoly money, ‘making it easier to spend.”<sup>44</sup>

In a study in which a visit to a supermarket was simulated, the volunteers spent more money when they paid with coupons instead of cash.<sup>45</sup>

In another experiment with real money, subjects were given either a dollar bill or a voucher with the value of \$ 1.<sup>46</sup> They could either keep the dollar, exchange the voucher for a dollar bill, or they could spend the dollar or voucher on a candy. Result: the voucher was used much more frequently to purchase the candy than the dollar bill.

As we have seen, timing and the non-linear connection between payment and consumption (product / service) can reduce the pain of payment of a credit card. But apart from that, the payment method itself plays an important role. In the case of debit cards, where the payment is made immediately, there is a high connection between the payment and the product / service.

<sup>43</sup> <https://es.dreamstime.com/stock-de-ilustraci%C3%B3n-formas-de-pago-image46179209>

Retrieved on 18.05.2017

<sup>44</sup> Raghurir; Srivastava 2008, pp. 214f

<sup>45</sup> Raghurir; Srivastava 2008, pp. 218f

<sup>46</sup> Here and in the following: Raghurir; Srivastava 2008, pp. 219ff

Yet here, a different pain of payment is observed. “[...] it is the abstract and emotionally inert nature of card payments that reduces the pain of payment.”<sup>47</sup>

Participants were paid 100 Danish kroner (about \$ 15.50 at that time).<sup>48</sup> Afterwards, coupons for coffee and beer for certain cafés and bars were auctioned. Some of the subjects could pay with cash, while others could pay with a debit card. The average bid of the subjects using the debit card was higher. This effect is also observed when using the so-called prepaid cards. In an experiment, students used the copying machine more frequently when they paid with a prepaid card instead of coins.<sup>49</sup>

Why do different payment methods cause a different pain of payment? It can mainly be attributed to two reasons.

1<sup>st</sup> Perceptual salience: In two experiments subjects had to simulate the purchase of office materials in front of a PC.<sup>50</sup> They could either pay with credit card, banknotes or tokens. In the first experiment, the credit card payment was done through a click, while the notes and tokens payments were carried out by a drag and drop feature (the subjects had to pull the banknotes/tokens into a virtual wallet). The participants spent more money with the credit card than the other two options, but there was no significant difference between the banknotes and the tokens. In the second experiment, the cash payment was made through one click, while the credit card payment was made by using the drag and drop feature. This time, less money was spent with the credit card. These results suggest that it is not the sight of money but the effort to count the bills which is responsible for a higher transparency and lower spending.

The second reason is the so-called priming.<sup>51</sup> The mere presence of a credit card logo leads people to estimate the prices of a restaurant to be higher.<sup>52</sup> People who pay with a credit card also attribute a higher price to a higher quality, rather than focusing on the product's characteristics.<sup>53</sup>

#### 1.4.4 Social support

In the same way that social support is known to reduce physical pain, it was examined whether it could also reduce the pain of payment.<sup>54</sup>

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47 Thomas et. al. 2011, p. 131

48 Here and in the following: Runnemark et al. 2015, pp. 287ff

49 Soman 2003, pp. 175ff

50 Here and in the following: Yeung 2014, pp. 16ff

51 Remmerbach 2016, pp. 279ff

52 Raghurir; Srivastava 2008, pp. 215f

53 Chen et al. 2016, pp. 23ff

54 Xu et al. 2014, p. 1

In an experiment subjects had a lower pain of payment in a simulated supermarket purchase when they experienced higher social support.<sup>55</sup> Another study showed that just a sign in the restaurant with a supportive message can raise the perceived social support and thus reduce the pain of payment.<sup>56</sup>

#### 1.4.5 Hedonism versus utility

Lastly, it plays a role, what the nature of the consumer goods is. Is it consumed because the product / service is fun, brings pleasure (hedonistic consumption) or is it really needed (utilitarian consumption)?

In a survey participants were asked how they would prefer to pay for a washing machine.<sup>57</sup> Either \$ 200 / month six months in advance or six months after the acquisition (analogous to the holiday question in the chapter "Timing"). This time however, the majority opted for the payment after the acquisition, thus acting rationally.

The above-mentioned supermarket experiment, which attempted to demonstrate the correlation between social support and pain of payment, also found that products of hedonistic nature cause a higher pain of payment.<sup>58</sup> However, a high level of social support for subjects was able to reduce it. On the other hand, social support levels didn't make a significant difference for product categories of an utilitarian nature.

#### 1.4.6 Further consequences of a low pain of payment

A low pain of payment not only affects the consumers' cost awareness, it also has a wider impact on their behavior.

In the same way that pain generally suppresses impulsive behavior, the pain of payment is able to restrain the consumption of unhealthy (junk) food.<sup>59</sup> Through an analysis of the buying behavior in a supermarket, it was found that the payment with a credit or debit card correlated strongly with the share of impulsive and "unhealthy" purchases (hedonistic nature in a wider sense).

A low pain of payment can also limit the negative effect of choice overload<sup>60</sup>. In an experiment, passersby (students) were asked if they wanted to buy a pen.<sup>61</sup> The number of different available pens was changed. In addition, some students were told that they

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55 Xu et al. 2014, pp. 5ff

56 Xu et al. 2014, pp. 7f

57 Here and in the following: Prelec; Loewenstein 1998, p. 6

58 Here and in the following: Xu et al. 2014, pp. 5ff

59 Here and in the following: Thomas et al. 2011, pp. 128ff

60 Choice overload refers to the psychological effect, in which too many product alternatives fatigue consumers and even lead to a loss of purchase (See <https://www.behavioraleconomics.com/mini-encyclopedia-of-be/choice-overload/>), retrieved on 24.04.2017

61 Here and in the following: A. M. Shah 2015, pp. 19ff

were only allowed to pay with cash; the others were only allowed to pay with their campus card (lower pain of payment). The number of buyers in both cases rose initially as the number of pens also rose. However, more than ten different pens (overload) had a negative impact on the purchase made by the cash-only-students. On the other hand, the purchasing behavior of the "customers" who used their campus card remained unchanged.

However, a pain of payment that is too low is not always an advantage for the seller (the famous notorious two sides of a coin). By increasing the pain of payment (and the correlating commitment), individuals feel connected with the company and appreciate the value of the products they buy.<sup>62</sup> This has consequences on their future loyalty to the company.

## 1.5 Mental Accounting

Mental Accounting describes the process of categorizing and mentally summarizing options and their consequences.<sup>63</sup>

The following example shows how strongly mental accounting influences our behavior:

During a poker night with friends gains or losses (which are usually not higher than \$ 50) considerably affect the players' behavior.<sup>64</sup> This even applies if these \$ 50 only represent a small part of their total assets. In contrast, a similar loss of \$ 50 on the stock market does not seem to affect them as much. From a rational point of view, people shouldn't care how much they lose on a single poker evening, they should rather evaluate how much their total wealth changed through it. Yet, the results from this single poker night are contemplated in a separate account.

"These rewards and punishments, promises and threats, are all in our heads. We carefully keep score of them. [...] The ultimate currency that rewards or punishes is often emotional,"<sup>65</sup>

Due to the loss aversion (see 1.3) we strive to avoid losses as much as possible.

It is not only the money of our exemplary poker night that is treated in a separate account.<sup>66</sup> This effect influences all your expenses, income and savings. We will now take a closer look at it.

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62 Here and in the following: A. M. Shah 2015, p. 102

63 Beck 2014, p. 178

64 Here and in the following: Thaler 2015, p. 80

65 Kahneman 2011, p. 334

66 Thaler 1999, p. 184

### 1.5.1 Mental accounting of expenses

The following example shows how Mental Accounting is applied to everyday expenses: Participants of a survey were asked if they would buy a ticket for a play.<sup>67</sup> The first group was told they had already paid \$ 50 for a basketball game this week. The other participants were told they had to pay a \$ 50 fine due to wrong parking. The participants from the first group were less willing to pay for the play, since the same mental account (leisure) has already been debited in the same week. A fine, on the other hand, is assigned to another account and is treated separately. Therefore, it doesn't affect people's decision to go see the play.

Organizing money into accounts or budgets violates the economic principle of fungibility.<sup>68</sup> People should consider how much money they have left for a theatre ticket rather than evaluating if they already spent money on a leisure activity this week.

For the basic existence of budgets there is, of course, a well-known justification.<sup>69</sup> There are budgets in companies to ensure that managers do not have to approve every conceivable issue without losing control. Individuals and families act in the same way. As with companies, money should be invested in a manner that serves the interests of a household (maximizing benefits). However, in both cases this is not always true.

The so-called range of self-control is affected by Mental Accounting. People are able to plan everyday expenses (such as food and cable TV). Yet this does not apply to extraordinary expenses (such as a wedding present or repair of the television).<sup>70</sup> This is true even though these *extraordinary* expenses occur repeatedly, just not always under the same mental account.

In an experiment participants were less willing to spend money on a gift for a friend if they could remember similar expenses such as birthday and wedding presents.<sup>71</sup> The difficulty of categorizing exceptional expenditure leads to budget overruns. However, these can evidently be reduced by recalling similar expenses.<sup>72</sup>

### 1.5.2 Mental accounting of savings

Savings are also distributed to different accounts.<sup>73</sup> In the mental pyramid of savings, cash is at its lowest level as it can be spent easily. Above this level, we see the money

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67 Chip; Soll 1996 quoted from: Thaler 2015, p. 74

68 Thaler 2015, p. 74

69 Here and in the following: Thaler 2015, p. 74

70 Here and in the following: Sussman; Alter 2012, pp. 803f

71 Sussman; Alter 2012, pp. 810f

72 Sussman; Alter 2012, p. 810

73 Here and in the following: Thaler 2015, p. 76

of a checking account. At the top of this pyramid, we find dedicated savings, e.g. Retirement. The latter are always "shielded", even if (irrationally) loans (with higher interest rates than the savings) must be taken.

In fact, many participants of an experiment decided to opt for a loan instead of using their savings for an emergency.<sup>74</sup> The nature of the savings determines the probability that this effect of the Mental Accounting occurs. In a personal emergency, accounts for the purposes of old-age provision, "children" and education are less frequently accessed than savings for a new car or a holiday.<sup>75</sup> Paradoxically, using money from an *important* "serious" account (e.g. old-age provision) for emergencies is seen as irresponsible. This is the case even though this way of thinking ultimately leads to the acceptance of suboptimal financial decisions.<sup>76</sup>

### 1.5.3 Mental accounting of income

The sources of revenue determine how these are used.<sup>77</sup>

For example, a tax refund is subjectively categorized as *serious*, accordingly, it is only used for important expenditures, e.g. repayment of debts.<sup>78</sup> On the contrary, the profit of a football bet is classified as *frivolous*, thus this kind of income is sooner spent on hedonistic consumption (1.4.5).

The money of an inheritance is a very special kind of income source.<sup>79</sup> Compared to other windfall gains, e.g. birthday money, it is much less likely to be spent on hedonistic consumption. Unlike a gift, a lottery win or salary, this money is also less frequently used in risky investments (like the stock market). The inheritance tends to be invested in the same way as it was by the deceased - and thus possibly still completely irrational according to the possibly special "preferences" of the deceased.

Revenues of a bet are treated much more relaxed, hedonistically.<sup>80</sup> Negative emotions due to a reduction in the salary, e.g. by reducing the variable salary component (accounting as a loss), weigh more than the losses of the money from a bet. The gain from a gambling game is therefore more often used for luxury spending, e.g. a luxury tie.

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74 Sussman; O'Brien 2014, pp. 11ff

75 Sussman; O'Brien 2014, pp. 17ff

76 Sussman; O'Brien 2014, p. 30

77 Thaler 1999, p. 196

78 Here and in the following: O'Curry quoted from: Thaler 1999, pp. 196f

79 Here and in the following: Tykocinski; Pittman 2013, pp. 508ff

80 Here and in the following: Peng et al. 2013, pp. 154ff

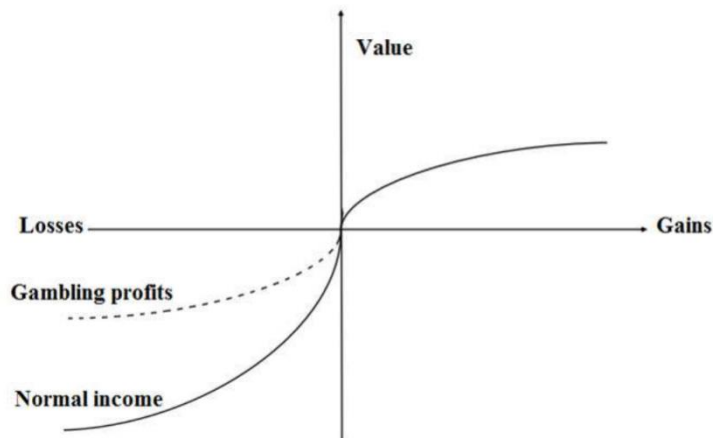


Figure 5: Loss aversion income versus gambling profits<sup>81</sup>

Gift cards also represent a special type of income. In an experiment, it was found that people prefer to pay for a novel (hedonist) with a gift card, while they prefer to buy a textbook (utilitarian) in cash.<sup>82</sup>

#### 1.5.4 Creative accounting

The different mental accounts, which, as exhibited, affect our actions so dramatically, follow no defined laws.<sup>83</sup> This flexibility is used to circumvent the self-control imposed by a mental account.<sup>84</sup> Depending on how broadly or narrowly we bracket the content of a mental account, it influences whether the mental account has black (positive) or red (negative) numbers at the end.<sup>85</sup>

In one study participants were given different budgets, one for food, leisure or clothing.<sup>86</sup> In the case of a clearly assignable expenditure such as a theatre visit, this was rejected if the budget for the specific account (leisure) was already exhausted. In the case of a less clearly attributable expenditure, such as going out to a restaurant with live music (possibility charging two different accounts), this was booked flexibly (arbitrarily) either

<sup>81</sup> Peng et al.2013, p. 152

<sup>82</sup> A data analysis of the expenditure in the Cornell university bookstore over many years confirmed these results See Helion; Gilovich 2014, pp. 387ff

<sup>83</sup> Thaler 1999, p. 184; Remmerbach 2016, p. 214

<sup>84</sup> Cheema; Soman 2006, p. 34

<sup>85</sup> Thaler 1999, p. 187

<sup>86</sup> Here and in the following: Cheema; Soman 2006, pp. 36ff



to the leisure mental account (live music) or the food account, depending on which account still had available budget.

"[...] similar to the tax evader who finds a loophole in tax laws to justify his actions, a consumer could also conceivably exploit ambiguities in the mental accounting process to justify giving in to temptation"<sup>87</sup>

We already saw: unexpected revenue such as birthday money can cause an even larger amount to be used hedonistically.<sup>88</sup> A participant gets \$ 100 for her birthday for example. Then, she finds a beautiful jacket (which she does not necessarily need; hedonistic nature) for \$ 60 and pays for it with her birthday money. After some time, she sees an offer for a round trip to a destination of her choice for only \$ 100; she perceives a "bargain". She now begins to mentally change the purchase of the jacket into her (necessary) clothing budget and buys the travel ticket from the \$ 100 freed by this "accounting trick". Thus, our participant can legitimate \$ 160 of hedonistic consumption with just a \$ 100 revenue. Reality is a construction.

Richard Thaler uses another example in which creative mental accounting takes place.<sup>89</sup> Participants were asked the following question: How much does the bottle of wine, which you are drinking now, cost you if you bought it a few years ago for \$ 20 and it is worth \$ 75 today? Many said it didn't cost them anything. Others even claimed that they had earned \$ 55. You already know the correct economic answer: the bottle costs \$ 75. (The incurred opportunity cost if someone drinks a bottle of wine at a price of \$ 75 instead of selling it).

„ Invest Now, Drink Later, Spend Never "<sup>90</sup>

### 1.5.5 Sunk-cost-effect

"Sunk Costs" result from past investments which, according to the rational economy, should be irrelevant for future decisions.<sup>91</sup> Nevertheless, due to the effects of mental accounting, the sunk-cost-effect influences human actions in a significant way as R. Thaler shows us in the following example:

A family pays \$ 40 for a basketball game.<sup>92</sup> However, on that day a strong storm occurs. The family decides to go to the basketball game nevertheless. If the tickets had been for free, they would not have driven there.

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87 Cheema; Soman 2006, p. 35

88 Here and in the following: E. Shah 2015, pp. 66ff

89 Here and in the following: Thaler 2015, pp. 68f

90 Thaler 2015, p. 71

91 Here and in the following: Thaler 1980, p. 47

92 Here and in the following: Thaler 1980, p. 9

As soon as you pay money for a ticket, a mental account opens.<sup>93</sup> The balance of the account is initially negative (- \$ 40 in the last example). Once you have been to the game, this balance is settled on the account due to the utility value of seeing the game (while also risking a possible accident).

You may have already observed a similar example: someone who has paid an annual membership in a tennis club<sup>94</sup> suffers from a tennis elbow two months later. Nevertheless, he tries to play as often as possible until the pain becomes unbearable.

A starting point to counteract the sunk cost effect is to visualize time as limited.<sup>95</sup> In an experiment participants were asked whether they would continue to watch a boring film they paid for \$ 10.95. The experimental group should also imagine that due to illness they do not have much time to live. They were better at ignoring the Sunk Costs than the control group.

In addition to irresponsible and irrational decisions, the sunk cost effect can also lead to budget overruns.<sup>96</sup> An experiment simulated a visit to the Disney's Food and Wine Festival.<sup>97</sup> For some participants the visit was for free while others had to pay \$ 10 for the admission. This prepayment induced the participants to spend more money on snacks than the other group. By rewarding themselves with higher expenses, people are able to compensate the costs of a prepayment.

The same tactic is used, for example, by Costco (with its \$ 55 annual membership) and Amazon (\$ 99 a year for free delivery).<sup>98</sup> However, the sunk cost effect of a prepayment is only obtained in cases where these costs are expected; Not when these arise suddenly.

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93 Here and in the following: Thaler 1999, p. 190

94 Here and in the following: Thaler 2015, p. 64

95 Here and in the following: Strough et al. 2014, pp. 78ff

96 Remmerbach 2016, p. 214

97 Here and in the following: Besharat 2012, pp. 81ff

98 Thaler 2015, p. 71

## 2 Impact on financial constraints

People who experience financial constraints are often influenced by the "psychology of money" in such a way that (unfortunately) encourages the maintenance of these financial constraints. Poverty itself leads people to continue living in poverty. Often, indebted people make decisions which promote the preservation of their debts. Why does this happen exactly? We will have a closer look.

### 2.1 Poverty

Poverty is defined as "Condition where people's basic needs for food, clothing, and shelter are not being met."<sup>99</sup> It is therefore a form of scarcity. This scarcity leads to the preservation of itself as in an autopoietic system; the solidification of poverty.<sup>100</sup> This is carried out by erroneous decisions, which neglect any future consequences, and the high consequential costs of these mistakes.

Fundamentally financial scarcity creates a tunnel view, in which money needs to be saved *now*.<sup>101</sup> This not only reduces non-essential consumption, such as the number of times you go to the cinema, but also important (our "serious") expenses such as health or crop loss insurance. Thus, money is actually saved in the short term, but in our crop failure example, the consequences for the poor are the highest in the case of damage, since they are not insured.

For many decision-makers it's not easy to isolate the consequences of a single decision.<sup>102</sup> As seen in "Creative Accounting" (1.5.4), the choices and effects of mental accounts can be narrowly or broadly analyzed. A broader version provides a more comprehensive overview of all costs and benefits.<sup>103</sup> A person who doesn't have much money to buy a new dishwasher, for example, purchases the cheapest one.<sup>104</sup> Assuming that quality and price are linked, this dishwasher will not be as durable as a more expensive variant which can lead to higher costs in the long term.

A very striking example of tunnel vision, with the result that decision-makers do not take future consequences into account, are the ragpickers in Chennai, India:<sup>105</sup> They rent a wheelbarrow for \$ 5-10 / month to allow them to do their work. The price of a new wheelbarrow is about \$ 30. It is desirable but not necessary for the ragpickers to have their

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<sup>99</sup> <http://www.businessdictionary.com/definition/poverty.html>, retrieved on 08.10.2017

<sup>100</sup> Mullainathan; Shafir 2013, p. 24

<sup>101</sup> Mullainathan; Shafir 2013 pp. 48f

<sup>102</sup> Read et al. 1999, p. 171

<sup>103</sup> Read et al. 1999, p. 172

<sup>104</sup> Here and in the following: Mullainathan; Shafir 2013, p. 138

<sup>105</sup> Mullainathan; Shafir 2013, p. 140

own wheelbarrow. The total costs over the amortization period is beyond their tunnel vision.

This example shows how tightly set mental accounts reinforce and consolidate poverty. In three to six months the price of the wheelbarrow has paid off. However, the ragpickers are not acting to take advantage of the positive effects of having their own wheelbarrow in the future; remaining in the tunnel. High rental costs are accepted since they represent less expenditure than the purchasing costs over the course of a month (thus reducing payments). However, once the entire costs for a year are summed up, the rental costs correspond to two to four times the purchase costs.

## 2.2 Debt management

In many so-called developed Western economies, e.g. Germany, people are not confronted with a situation that is as difficult as that of Indian ragpickers. Nevertheless, a lot of people accumulate debts which are often very difficult to get rid of.

In 2016, 6.85 million individuals were overindebted in Germany.<sup>106</sup> This figure has risen steadily since 2013. Individuals are considered to be in this situation when they cannot settle their payment obligations in a foreseeable future. They also have no assets or access to credit to cover their means of subsistence.

Causes of over-indebtedness are, above all, incalculable events such as unemployment and / or illness.<sup>107</sup> However, about ten percent of all cases are attributed to (self-inflicted) inefficient household management since people do not deal rationally with their debts.

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<sup>106</sup> Here and in the following: <https://de.statista.com/statistik/daten/studie/166338/umfrage/anzahl-der-schuldner-in-deutschland-seit-2004/>, retrieved on 05.05.2017

<sup>107</sup> Here and in the following <https://de.statista.com/statistik/daten/studie/75446/umfrage/ursachen-von-verschuldung-in-deutschland-in-2008/>, retrieved on 05.05.2017

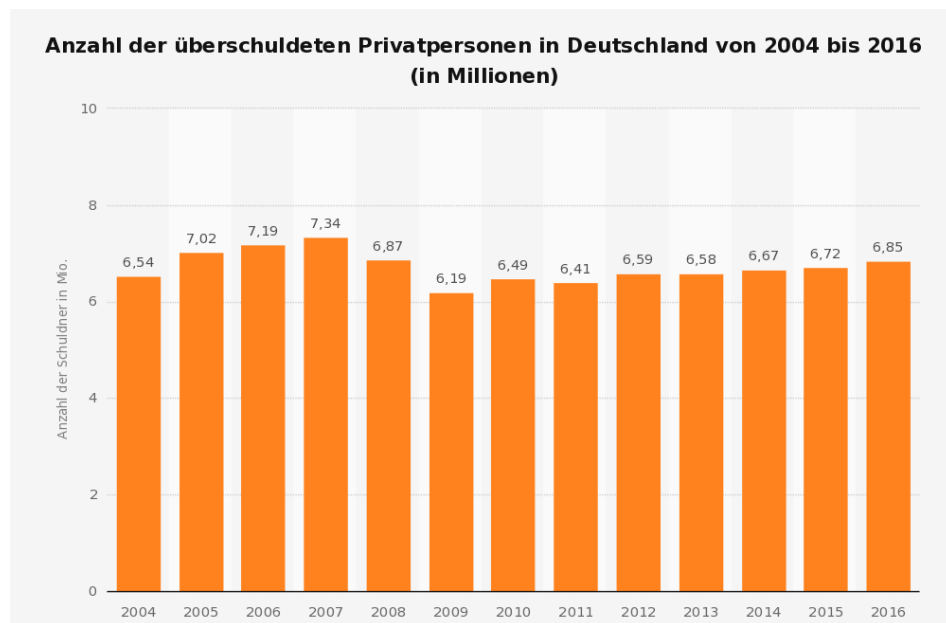


Figure 6: Number of overindebted people in Germany from 2004 till 2016 (in millions)<sup>108</sup>

### 2.2.1 Irrational debt repayment

For a consumer who is subjected to the effects of Mental Accounting, the reduction in the number of his credit contracts represents a greater improvement compared to a reduction in the total amount of the debt.<sup>109</sup> When each individual credit is assigned to its own mental account, the redemption of one of these contracts brings joy since it means that less mental accounts are in the red.

In an experiment participants should decide how they would assign a certain money sum to two hypothetical credit card balances.<sup>110</sup> The debts were \$ 600 and \$ 1,200 respectively. The annual interest on the loan was 12% and 18% for group 1 and vice versa for group 2. The participants had \$ 200, \$ 400 or \$ 600 available to settle part of the debt. The rational decision, in this case, is to assign the money to the loan with the highest interest rate. Nevertheless, the participants allocated more frequently the money to the smallest credit, even when the larger credit had a higher interest rate. Only when a smaller sum (\$ 200) was available, did the majority of the participants behave rationally. The conductor of this experiment suggests that we don't observe this effect when the repayment sum is \$ 200 because it does not lead to a complete settlement of any of the open credit balances. In contrast, with a higher available amount (\$ 400 - \$ 600) the

<sup>108</sup> <https://de.statista.com/statistik/daten/studie/166338/umfrage/anzahl-der-schuldner-in-deutschland-seit-2004/>, retrieved on am 05.05.2017

<sup>109</sup> Here and in the following: Besharat 2012, p. 12

<sup>110</sup> Here and in the following: Besharat 2012, pp. 19ff

smallest loan could be (almost) paid off. This is so attractive to many that they fall for an irrational decision.

Hence people are able to minimize their current psychological costs: in contrast to the rational solution, the settlement of an account weighs more than the best possible debt clearance strategy. This experiment is of great practical relevance for countries like the US, as households there have an average of four<sup>111</sup> credit cards. The credit card debt accounts for \$ 16,748 and it costs each household about \$ 1,300 on interests / year.<sup>112</sup>

In Germany, the use of several credit cards is far less common.<sup>113</sup> However, many people there have an overdraft line of credit in addition to a credit card. If they use this kind of credit, they risk paying expensive overdraft interest rates which often cost more than taking a normal bank credit over the course of a year. The use of installment loans is also widespread in Germany. These are often used to finance consumer goods.

The type of income can also affect how rational debts are paid off. As shown in the section "Mental Accounting of Income", the money from different income sources is evaluated differently. Money from *serious* sources of income, e.g. own savings, is given away more cautiously.

In an experiment, in which participants had to repay a certain sum of money for credit card debts, it was examined if the source of the money used played a role.<sup>114</sup> The annual rate of interest on loans also varied. The sources of the money were savings totaling \$ 600, rewards of a frequent flyer program of an airline worth \$ 600, or an unexpected bonus of \$ 600. The participants who were to pay the debts with their savings were more rational than the others, who had been given the money "effortlessly".

### 2.2.2 Irrational financing choice

It has already been explained how the "psychology of money" can negatively affect the debt repayment modes. It also (in addition) contributes to the suboptimal choice of financing from the start.

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111 <https://www.statista.com/statistics/650858/credit-cards-per-household-by-country/>  
retrieved on 05.05.2017

112 Vgl. <https://www.nerdwallet.com/blog/average-credit-card-debt-household/>,  
retrieved on 06.05.2017

113 Here and in the following: [http://www.faz.net/aktuell/finanzen/meine-finanzen/  
geld-ausgeben/kreditkarten-boom-kreditkarten-sind-immer-teuer-und-oft-ueberfluessig-  
12996029.html](http://www.faz.net/aktuell/finanzen/meine-finanzen/geld-ausgeben/kreditkarten-boom-kreditkarten-sind-immer-teuer-und-oft-ueberfluessig-12996029.html), retrieved on 07.05.2017

114 Here and in the following: Besharat 2012, pp. 37ff

In a field study the behavior of Mexican consumers, who had multiple credit cards with different annual interest rates, was examined.<sup>115</sup> It was found that consumers generated about 21% of their debts with a more expensive credit card even though the credit line of the cheapest credit card was not yet exhausted. Apart from the interest rate, the credit cards did not differ much. To be more precise, there were no loyalty points or other rewards.

In a further experiment with Mexican consumers, who also had multiple credit cards, it was examined how a strong reduction in the interest rate of one of the credit cards could influence their behavior.<sup>116</sup> A reduction in the monthly credit rate from 2.4% to 1.2% was granted to some of the consumers for a period of one to three months on a given card. During this time the debts incurred with the discounted credit card rose as expected. However, the use of the other credit cards remained unchanged - overall, the customer was thus more indebted than before.

One possible explanation for this behavior can be found in mental accounting:<sup>117</sup> People assign specific activities to a single credit card. Two credit cards are therefore used for two different purposes.

As we can see, a reduction in the interest rate of a credit card increases its use but only for the expenditures within the boundaries of the associated mental account. For the remaining expenses, the other credit cards are used, thus the better conditions of the cheapest credit card are not fully exhausted.

### 2.2.3 Irrational handling of owed money

The "psychology of money" causes people to interact more carelessly with their debt.

Cryder and Xiao suggest, based on their studies, that a credit generated by a credit card is mentally recorded by some people as a windfall profit.<sup>118</sup> Since the credit card users don't psychologically see themselves in the loss area, the money of this "profit" is spent more easily,

In a series of experiments it was found that debts borne by credit card use are more often felt to be a gain than those generated by loans; even though both implicate the same financial obligations.<sup>119</sup> In an experiment participants had to assess an increase in their credit line by \$ 500 or a \$ 500 loan as either a gain or loss. The credit line increase was more often rated as a gain. A further study found that an increase in the credit line triggers

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115 Here and in the following: Ponce et al. 2014, pp. 10ff

116 Here and in the following: Ponce et al. 2014, pp. 17ff

117 Here and in the following: Ponce et al. 2014, pp. 25f

118 Here and in the following: Cryder; Xiao, p. 32

119 Here and in the following: Cryder; Xiao, p. 33

a sense of happiness among the participants while a loan did not spark any positive or negative emotions. Lastly, it could be stated that the money of a credit card - as to be expected based on the preliminary results - is more frequently spent in hedonistic consumption (such as concerts or flight tickets).

To sum up: Over-indebtedness by means of a credit card is thus not only favored by a low pain of payment as we already saw on the first chapter. Mental accounting also contributes to this "irrational behavior".

### **Empirical Study on Mental Accounting - Effects on Financing Choices**

In our study we examine how the formation of mental accounts leads to irrational decisions which are economically suboptimal for the consumers. As shown in the "Mental accounting of savings" (1.5.2), people tend to take out loans even though they have enough money in their accounts, resulting in a reduction of their total savings.

Our empirical study does not provide any representative results. It is limited since it was carried out by means of surveys and is not derived from the real context of the participants. Based on the above-mentioned findings, we were interested in how our participants would pay for a product of a hedonistic nature (iPhone 7). Would they be able to take advantage of their savings, which were there originally for the purpose of buying a home, or would they prefer to take a loan? Considering the effects of mental accounting, it is to be assumed that our participants would take up an (expensive) loan to secure their important ("serious") savings.

We reported on chap. 1.3.2. on the intercultural effects of the "psychology of money". Due to the nationality of one of the authors of this working paper, we contacted 35 students (average age: 28 years, female percentage: 63%) of the master's degree "Corporate Finance" from a renowned Colombian university of business management in Bogotá. The participation rate was 100%. The following situation was presents to them:

- For a long time, you have wanted to buy an iPhone 7. However, the price of 2,790,000 pesos (about 930 €) seems to be too high for you. However, this week, thanks to "Black Friday", all smartphones have a 10% discount. This offer appears to be attractive enough for you to buy the iPhone 7. With regards to the payment, you have two alternatives. You could use the money from a special account created for the purpose of funding the down payment of your first apartment. This account currently contains 10,000,000 pesos (about € 3,300). The second alternative is to finance the iPhone with your credit card over the course of twelve months. The monthly interest on the credit card is 2.42%. Which of these two alternatives do you choose?



The majority of the participants, a total of 22 (63%) persons, opted for the payment with a credit card.

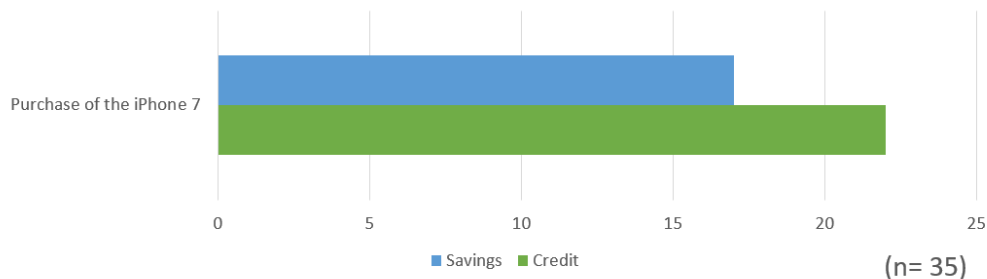


Figure 7: Results Mental Accounting on Financial decisions

Presumably, participants perceive their (virtual) savings to be so *sacred* that they prefer to borrow money (interest rate of 2.42%). In Colombia, numerous banks offer short-term saving bonds with annual interest rates of up to nine percent. Even so, the cost of a credit card with 2.42% monthly interest rate is still higher, so that it makes more sense to settle the purchase price with the savings. Since our participants are students of the Master's degree course "Corporate Finance", it is fair to assume that they are familiar with the effects of interest rates. Nevertheless, mental accounting pushes them in the wrong direction. By opting for the economically suboptimal solution they are now even further away from the goal of buying an apartment. It would have been more rational to buy the iPhone 7 with the savings. This way, they don't need to pay any interests. It is more profitable to pay back the money into their own savings account in the following twelve months, rather than paying interests to the bank.

"The mind, challenged by the psychology that emerges from scarcity, may find itself needing to navigate a world that is computationally more complex."<sup>120</sup>

In Germany for example, it is widespread that consumers finance their smartphones via a mobile phone provider through a 24-month contract. Attractive initial prices are offered, in which the buyer only pays the symbolic amount of "1 €".<sup>121</sup> Not surprisingly, the monthly fees are higher compared to a singular bundle-free purchase of the phone. This difference can be up to 38%.

<sup>120</sup> Mullainathan; Shafir 2013, p. 85

<sup>121</sup> Here and in the following: <http://www.finanztip.de/handy-kaufen/handy-mit-oder-ohne-vertrag/>, retrieved on 12.05.2017

### 3 The impact of digitalization

Digitalization is in full swing.<sup>122</sup> It affects all of us and ensures a profound change in every area of our lives. This digital transformation opens up great opportunities for greater quality of life, revolutionary business models, and a more efficient resource management.

Using keywords such as Industry 4.0 a lot is being said about how the digital economy opens up new markets and which business models will be completely changed.<sup>123</sup> These changes also reflect how consumers interact with products / services.

The ever-growing digital payment market is replacing traditional payment methods such as cash. They are more efficient, faster and enable new business models. This has a direct effect on the level of pain of payment among consumers. The development of the so-called mobile applications also contributes to this change. The novel form of the relationship between man and technology changes the way the decision-making architecture (frame), in which consumers interact with goods and services, takes place. Last but not least, there is a great potential for change, all of which we have already heard and read through the so-called IoT<sup>124</sup> products which have triggered this process and are accelerating at high speed.

#### 3.1 Digital payments

Cashless transactions are expected to account for the majority of transactions by 2023 at the latest.<sup>125</sup> This development is now mainly driven by digital payment methods.

The trend towards a higher proportion of digital payment transactions can be attributed in particular to the growth of smartphone users.<sup>126</sup> It is expected that the number of mobile Internet users in 2020 will have risen to 3 billion. It is also through the development of new technologies that the number of payment modes rises. At the same time, experts expect that the number of security measures against financial fraud will increase, e.g. by the introduction of biometric authentication. Companies from various industries, such as smartphone manufacturers (e.g. Apple), IT (e.g. Google), telecommunications (e.g. Vodafone), retailers (e.g. Walmart) and startups have contributed to this technological development and the process known as business migration.

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122 <http://www.bmwi.de/Redaktion/DE/Dossier/digitalisierung.html> , retrieved on 18.04.2017

123 [https://www.bundesregierung.de/Webs/Breg/DE/Themen/Forschung/1-Hightech-Strategie/1-Digitale-Wirtschaft-Gesellschaft/Haupttext/\\_node.html](https://www.bundesregierung.de/Webs/Breg/DE/Themen/Forschung/1-Hightech-Strategie/1-Digitale-Wirtschaft-Gesellschaft/Haupttext/_node.html) , retrieved on 18.04.2017

124 Internet of Things

125 Here and in the following: The Boston Consulting Group 2016, p. 4

126 Here and in the following: The Boston Consulting Group 2016, p. 4

Many governments around the globe welcome this new trend. In November 2016 the Indian government withdrew the banknotes of higher value from the market to clear out black money and fight against corruption.<sup>127</sup> In Kenya M-PESA allows money transactions for persons who do not have access to the banking system. The users of this payment system benefit considerably since carrying cash in Kenya is often associated with security risks.<sup>128</sup>

In principle, digital payment methods can be classified into dependent or independent from the point of sale.<sup>129</sup> The point of sale independent methods are money transfer services such as PayPal. They are perfectly suitable for e-commerce. For the point of sale method, the consumer must be present at the store. The payment procedures can be executed through software, for example, the vendor can scan a QR code to perform the payment process. With an NFC<sup>130</sup> chip, payment transactions can also be carried out with the smartphone on site. This technology is the same technology used by Google Wallet and Apple Pay. With it, the vendor can easily access their customer's digitally stored coupons, credit/debit cards etc.









		Equipment	
		Software	Hardware
Location	POS-dependent	 Square  LevelUp	 ISIS  pay  Apple Pay  SAMSUNG pay
	POS-independent	 PayPal	 Google  TESCO

Figure 8: Classification of different digital payment methods.<sup>131</sup>

127 <https://www.forbes.com/sites/wadeshepard/2016/12/14/inside-indias-cashless-revolution/#42359f8a4d12>, retrieved on 22.04.2017

128 The Boston Consulting Group 2016, p. 10

129 Here and in the following: Falk et al. 2016, p. 2418

130 Near Field Communication

131 Falk et al 2016, p. 2418. Here payment methods are classified into POS (point of sale) dependent or independent.

The digitalization of payments facilitates the further development of the online trade, and at the same time, strongly influences the conventional stationary trade.

### 3.1.1 E-Commerce

From the consumer's point of view, e-commerce entails many advantages. According to a survey of German consumers, these advantages are good prices, the comfort of shopping without having to leave your home, wide range of offers, shopping around the clock and good search and comparison possibilities (transparency).<sup>132</sup>

German retailers fear that the majority of future purchases will take place online as the growth rates are correspondingly disproportionate. Thus, in the future, some retail stores might be forced to close - with all the intensively discussed consequences for the inner-city infrastructure and attractiveness.<sup>133</sup> The fact is that the sales volume of e-commerce already amounted to € 50.674 billion<sup>134</sup> in 2016. This corresponds to 14% of total trade turnover in Germany.<sup>135</sup>

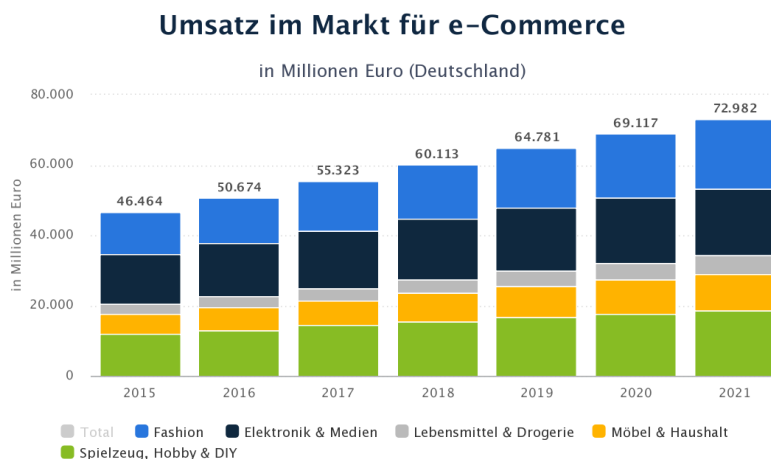


Figure 9: Forecast E-Commerce turnover in Germany till 2021 (in millions of euros)<sup>136</sup>

<sup>132</sup> <https://de.statista.com/statistik/daten/studie/425496/umfrage/umfrage-zu-vorteilen-des-online-shoppings-gegenueber-dem-stationaeren-einkauf/>, retrieved on 18.04.2017

<sup>133</sup> <https://www.welt.de/wirtschaft/article161812481/Dem-deutschen-Einzelhandel-droht-ein-Massensterben.html>, retrieved on 19.04.2017

<sup>134</sup> <https://de.statista.com/outlook/243/137/e-commerce/deutschland#market-revenue>, retrieved on 19.04.2017

<sup>135</sup> <https://de.statista.com/statistik/daten/studie/73412/umfrage/e-commerce-anteil-am-gesamtumsatz-der-unternehmen-2008/>, retrieved on 19.04.2017

<sup>136</sup> <https://de.statista.com/outlook/243/137/e-commerce/deutschland#market-revenue>, retrieved on 19.04.2017

Based on his own experiments concerning the pain of payment, in which participants tested different payment methods in front of a PC, L. Yeung concludes that the computer interface strongly influences consumers' behavior.<sup>137</sup> With the introduction of "One-Click Payments", well-known at Amazon and Paypal, consumers will turn towards more budget-overruns.

In a qualitative study, a participant describes how he perceives online shopping psychologically:

*"it's not a real transaction. I know it is, I know the money is going to come out but psychologically if you just pop your details in, it doesn't feel like you are spending money"*<sup>138</sup>

By changing the *payment method*, the consumer experiences a lower pain of payment.

The *timing* concept also takes effect in e-commerce. Generally, there are a few days between the payment process and the goods delivery. At Amazon, one of the largest companies and innovators in e-commerce, the bill is not presented directly to the users. Only after the goods are dispatched, the user has the possibility to see the bill, which must, however, be actively searched.<sup>139</sup> At the end, when the payment is blurred into a single credit card bill, the market-oriented, influencing company has done everything it can to reduce the *coupling of payment and goods*.

Paysafecard offers another way of doing online shopping. Users can charge money into this application at different points of sale.<sup>140</sup> This way, users can protect themselves from financial fraud, since they do not need to share their bank information. However, they have to put up with a lower pain of payment due to the effects of a prepayment.

Since e-commerce is steadily gaining importance, payment methods with a higher pain of payment (such as cash) will be replaced by other ones, which can intentionally reduce the pain of payment.

### 3.1.2 Digital payments on site

Digital payment solutions on site have a similar effect on the pain of payment. Since the introduction of Apple Pay and Android Pay, it has been discussed whether these digital wallets make the payment process *too easy* and what possible consequences that has.<sup>141</sup> Ariely believes that digital wallets are able to influence the pain of payment (both

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137 Here and in the following: Yeung 2014, pp. 43f

138 Krol et al. 2016, p. 4

139 See <https://www.amazon.de/gp/help/customer/display.html?nodeId=712192>, retrieved on 19.04.2017

140 See <https://www.paysafecard.com/de-de/>, retrieved on 19.04.2017

141 <http://www.wired.co.uk/article/2016-will-be-more-expensive>, retrieved on 19.04.2017

positively and negatively), depending on how they are designed. He fears though that the current trend goes towards a carefree consumption.<sup>142</sup>

A recent study suggests that mobile payment transactions have an even lower pain of payment than card payments: In the study, a supermarket visit was simulated.<sup>143</sup> The participants were provided with \$ 50 either through a debit card or charged into a smartphone application. They were ordered to look for certain products and then pay for them. After this, they were allowed to keep the remaining money. The smartphone application was similar to Google Pay or Apple Pay since only a button had to be pressed to realize the payment. In this study the purchase volume as well as the price perception (are prices perceived to be expensive or cheap) of the supermarket were examined. The result: the purchasing volume was the largest in mobile payment transactions and the participants rated the prices comparatively fairer than the participants who made their purchases with the credit card.

A possible explanation for a lower pain of payment in mobile payment transactions compared to that of a card payment is the nature of the payment process. A click on the smartphone is quickly made and thus generates a pain of payment which is at least shorter in time than the passing through of a card with through a magnetic stripe.

An interview of a qualitative study on the topic of purchasing habits already shows that users perceive contactless credit cards trigger a self-control loss. *“I’ve avoided [contactless], none of the cards I’ve been issued with is contactless, I just prefer to have some control.”*<sup>144</sup>

As expected, we see the biggest difference of pain of payment between mobile wallets and cash. The latter could be massively pushed back in the future since some governments actively promote their substitution in the form of mobile wallets.

## 3.2 Internet of Things

With the internet of things the PC disappears and is replaced by smart devices. These are interlinked to make our everyday life easier.<sup>145</sup>

By 2020, around 24 billion IoT products will exist worldwide and will transform many sectors including retail.<sup>146</sup> How do these changes affect consumer behavior?

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142 <http://danariely.com/2014/09/27/ask-ariely-on-technologys-painless-payment-email-equilibrium-and-tp-tribulations/>, retrieved on 19.04.2017

143 Here and in the following Falk et al. 2016, pp. 2420f

144 Krol et al. 2016, p. 4

145 QVC Handel LLC & Co. Kg 2016, p. 53

146 <http://www.businessinsider.de/what-is-the-internet-of-things-definition-2016-8?r=US&IR=T>, retrieved on 22.04.2017

For the majority of Germans a supermarket visit is linked to stress and time constraints and they feel unsettled when other customers hinder a fast process.<sup>147</sup> Customers are therefore looking for greater efficiency which can be attained with the aid of automatic orders using "machine-to-machine communication".<sup>148</sup>

Amazon already provides an insight into this technology with the product Amazon Dash Button.<sup>149</sup> This is a small device which is connected to the Internet via WLAN<sup>150</sup>. For example, if the customer realizes there is almost no detergent left at home, he can automatically order a refill just by pressing a button. It's no longer necessary to take the time to go to the supermarket for these small tasks.

However, this efficiency also means that the user loses control over his or her expenses. The payment process becomes more intransparent. At best, the customers will merely receive a message confirming their order. The processes may become even more efficient and less transparent if the orders take place without any notification via machine-to-machine communication.

Future sales strategies could therefore look as follow:<sup>151</sup> a retailer grants a high discount to a printer, but only under the condition that the cartridges are automatically ordered shortly before they are used up. Even today, 32% of Germans could imagine using such a service.

As of now, this strategy has been successfully applied in the B2B<sup>152</sup> realm.

Many marketing textbooks suggest that business-to-business (B2B) domain is dominated by 'rational action and decision-making' - a huge fallacy.<sup>153</sup>

Häusel reports on how the assembly technology company Würth implements these theories in business.<sup>154</sup> Würth has discovered that small components (C-parts) are important for the production. However, the craftsmen often do not pay much attention to them. This has led to a variety of production problems. In order to eliminate this problem, the company has developed a shelf for these C-parts which is filled automatically. The craftsmen pay only for what they actually use. Thus, Würth's approach offers them efficiency. The craftsmen no longer have to worry about the tedious procurement. At the same time, however, this means that they no longer pay attention to prices every time they take a

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147 [www.mymarktforschung.de/de/ueber-uns/pressemitteilungen.html](http://www.mymarktforschung.de/de/ueber-uns/pressemitteilungen.html) quoted from: QVC

Handel LLC & Co. Kg. 2016, p. 35

148 QVC Handel LLC & Co. Kg. 2016, pp. 35f

149 See <https://www.amazon.de/Amazon-Dash-Button/b?ie=UTF8&node=10852572031>, retrieved on 22.04.2017

150 Wireless Local Area Network

151 Here and in the following: QVC Handel LLC & Co. Kg. 2016, p. 36

152 Business to Business

153 Häusel 2014, p. 223; on the forecast of B2B cf. Remmerbach, Röllig 2015

154 Here and in the following: Häusel 2014, pp. 232f

product. This benefits Würth. The alleged efficiency evaporates if the cognitive follow-up costs are not taken into consideration.

Würth manages this shelf system using RFID<sup>155</sup> chips which inform the company when a product is taken out of the shelf.<sup>156</sup> Billing can thus be carried out automatically. Hence the craftsmen experience a lower pain of payment.

IoT solutions not only change the customer's digitally initiated consumption at home but also the transaction process in the stationary retail sector. An example for this are the supermarkets that Amazon will launch, called "Amazon Go". In the outlet Amazon Go there is no need for cashiers.<sup>157</sup> The customer "merely" needs to have an account at Amazon and download a special smartphone application. The visitors only need to take out their mobile phones when they enter the store. At this point, the products can simply be taken out of the shelves. After this, the customer leaves the supermarket. The payment is made automatically by means of sensors which record which products were purchased by whom.

Machines that automatically order your products (such as an intelligent printer) and innovative outlets such as Amazon Go may create the least pain of payment among all other options. This is because there is not even the need for a confirmative click and the perceptual salience of the "decision makers" is reduced to an absolute minimum.

In the future, the dividing line between online and offline will further disappear.<sup>158</sup> Some companies like IKEA, which are traditionally located on the outskirts of the city, are now opening stores directly in the city. These stores serve mainly as showrooms for their products. The actual purchase is made online. Nevertheless, if the payment process is concluded at the store, the shops of the future could increasingly forgo their cash registers: the payment is carried out automatically by means of sensors and applications; shopping barriers vanish.

### **Empirical studies on smartphone applications**

Already today, we are witnessing a change in traditional business models thanks to smartphone applications. This is very evident in the transport solutions sector. In many cities, public transportation tickets can already be purchased through the smartphone.

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155 Radio Frequency Identification

156 <http://www.technik-einkauf.de/ratgeber/c-teile-regal-fordert-automatisch-nachschub/>,  
retrieved on 23.04.2017

157 <http://www.zeit.de/wirtschaft/unternehmen/2016-12/amazon-go-supermarkt-lebensmittel-service-einkaufen-datenschutz-zukunft>, retrieved on 22.04.2017

158 Here and in the following: QVC Handel LLC & Co. Kg 2016, p. 21



New services are being developed like Car2Go, with which users can rent a car for a certain time.<sup>159</sup> It is paid per minute using an application.

Currently, the so-called ride-sharing applications are prompting a massive change in the traditional business model of taxi drivers. One of the most recognized applications in this field is Uber. With Uber, people who own a car can transport passengers as if their cars were taxis. The connection between driver and passenger is carried out by this application. The users demand the ride and immediately see how much it costs. They only need to confirm the ride with one click and their credit card is automatically debited.<sup>160</sup>

This kind of business is not yet approved in most regions in Germany. Despite this, the taxi business is also undergoing a modernization through applications such as myTaxi. The payment for the trip as well as the possible tip for the driver are payed through the application.<sup>161</sup>

In our first study we wanted to examine how public transportation applications affect the level of pain of payment. The hypothesis: due to simplified payment procedures the users neglect the costs which ultimately leads to a lower pain of payment. If users do not know their expenses, these cannot cognitively get into their consciousness.

46 participants (average age: 35 years old, female percentage: 59%), all of them employees of an international group of the automobile industry in the Stuttgart region (Germany), took part in our study. Participants predominantly had technical (engineers) or commercial backgrounds. As with our last study, this one does not either provide any representative results for the reasons already mentioned above.

We asked the participants whether they had used applications such as VVS APP<sup>162</sup>, Car2Go or Moovel<sup>163</sup> during the last three months. If so, they should describe how well they can assess their expenditure during those months. They could choose between the following options: Very good (accuracy <5%), good (accuracy <15%), not so good (accuracy <50%) and not at all (accuracy > 50%).

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159 <https://www.daimler.com/produkte/services/mobility-services/car2go/>,  
retrieved on 16.05.2017

160 <https://www.uber.com/de/ride/how-uber-works/>, retrieved on 20.04.2017

161 <https://de.mytaxi.com/fahrgast.html#bezahlen>, retrieved on 16.05.2017

162 Mobile Application for the public transport system in the Stuttgart region.

163 Mobile Application, which integrates both Car2Go and Stuttgart's public transportation service in one.

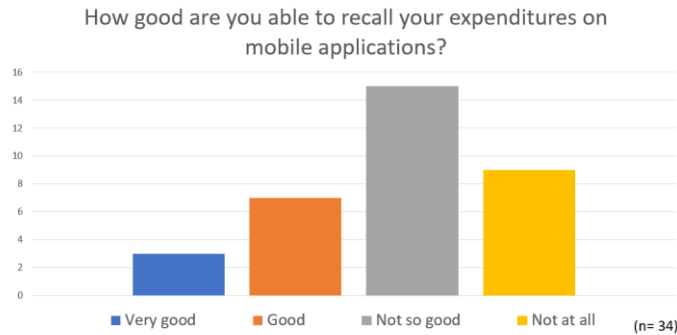
**Results:**

Figure 10: Results of the study effects of mobility Smartphone-Applications on consumers' pain of payment level

Out of the 46 participants, 34 have used at least one of the above-mentioned applications within the last three months. Out of these, the people who were well aware of their total expenditure on these applications were in the minority. Only ten participants were able to remember well or very well how much money they spent.

It is not surprising that the participants did not exactly remember their expenses, the interviewed period of three months surely played a role here. However, nine participants (about 20% of the interviewees) did not know what they had spent at all. These results thus confirm a low *coupling of payment-service* with the use of mobile applications. It is only till the end of the month that users' cards are charged. But they can no longer allocate which part of the bill belongs to these transport costs.

Even in direct comparison to traditional taxis the so-called ride-sharing applications should comparatively reduce the pain of payment. Taxis are regarded as particularly *painful* since the taximeter makes the costs particularly visible for the passengers. The costs of a taxi ride are based on the distance traveled and the time spent. Ride sharing applications, on the other hand, show the costs of the journey only once before it starts and the payment is done with a single click on the smartphone. Therefore, the costs are not always visible during the journey. It is feasible that the cost of a taxi ride should be perceived as more painful compared to an Uber ride.

In a second study on mobile applications we were able, as expected, to detect a higher pain of payment in our participants of the taxi group (M = 57) than those in the Uber

group (M = 45). In this case, too, no representativeness of our study can be assumed due to the small sample.

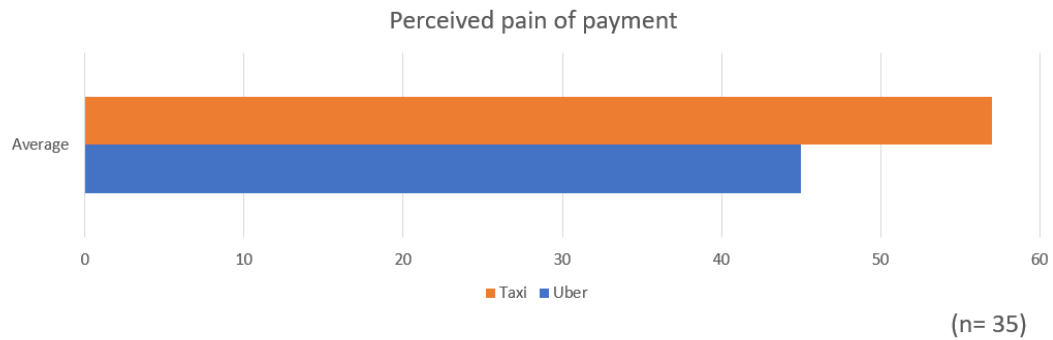


Figure 11: Results Pain of Payment using Taxis and Uber

Why do our participants feel a different pain of payment, even if the total costs remain the same?

Since the displayed amounts in the taximeter were brought up continuously, the costs for the taxi participants were more visible compared to those of the other group. As mentioned above, this situation typically corresponds to reality. This results in a higher pain of payment. The increase in the amount in the taximeter, therefore the loss of money through the use of this service, is always visible for the consumer.

In a third study on mobile applications, we examined whether the above-mentioned applications could increase the willingness to give tips.

Studies suggest that the use of tablets at the point of sale stimulate consumers towards giving higher tips.<sup>164</sup> When paying with a credit card, consumers see on a screen how much tips they can give. You could, for example, choose between 15%, 20% or 25%.

<sup>164</sup> Here and in the following: [http://www.slate.com/articles/business/moneybox/2014/03/starbucks\\_square\\_and\\_e\\_payments\\_do\\_new\\_point\\_of\\_payment\\_systems\\_increase.html](http://www.slate.com/articles/business/moneybox/2014/03/starbucks_square_and_e_payments_do_new_point_of_payment_systems_increase.html), retrieved on 20.04.2017

You also have the option to choose another amount or not give a tip at all. However, most people choose one of the given amounts. This system has already been put into practice by Starbucks in the US and the taxis in New York. In Germany, this practice is not yet widespread. However, the application myTaxi presents its users a similar interface on their smartphones.

In our experiment the first group had to imagine they called a taxi through "myTaxi". The trip costs € 27.20. Then they should decide how much they want to tip the driver. The participants could choose between "15%", "20%", "25%" or "other amount".<sup>165</sup> This way, a realistic interface was emulated.



Figure 12: myTaxi Smartphone Interface<sup>166</sup>

The second group served as the "control group". They should imagine that they had taken the taxi directly at the street. The trip also costs € 27.20 and they should also specify if and how much tip they want to give the driver. No sum was recommended.

The "myTaxi" question was answered by 24 participants. 22 participants belonged to the control group. As expected, the first group gave a higher tip on average ( $M = 2.79$  €) compared to the control group ( $M = 2.59$  €). About one third of the "myTaxi" Group's participants decided to use one of our recommended percentages. Five people paid 15%

<sup>165</sup> The percentages chosen for this study do not match the actual figures used by myTaxi

<sup>166</sup> <https://curved.de/news/wie-apple-pay-myTaxi-laesst-per-fingerabdruck-bezahlen-148837>

Retrieved on 17.05.2017

and two 20%. However, as with our other empirical studies, because of the small sample, no significance can be derived from this study.

None of the participants chose "25%". Nevertheless, its existence plays a role, it probably helped to make the figures "15%" and "20%" appear comparatively smaller. It served as a trojan ("decoy"), as an anchor where "15%" and "20%" were perceived to be relatively smaller.

The taxi costs of 27.20 € were chosen deliberately as the majority of the population in Germany tends to round up their tipping. In fact, the sum "2.80 €" was the most common. (In the control group, this figure was only exceeded a total of three times, whereas in the "myTaxi" group, it was seven times).

Our study confirms that a smart design of an application, oriented to the real decision-making process, can increase the willingness to spend more money. Pre-settings (here in the form of tip money categories) serve as an anchor which tempts users of this "make life-easier" - smartphone applications to accept higher expenditures.

Consumers do not make their decisions based on a calculation of all costs / benefits and they certainly do not take into account the (virtual) opportunity costs but rather take cognitive shortcuts which simplify their decisions or make them possible according to their own cognitive capacity.

The implications of these real decision-making processes are of great importance: for people who live in poverty, this results in long-term consequences which often reinforce the conservation of this poverty as a status quo. It is through the effects of a mental accounting that decisions are made in order to maximize ad hoc the subjective psychological benefit. Yet through this behavior, the decision-makers are removing themselves from their own achievable economic "prosperity".

The digitalization alters existing business models which is expressed in a fundamental transformation of the consumer-goods/service relationship. These changes result in a higher efficiency, but at the price of a reduced pain of payment which in turn can lead consumers to lose their self-control on their expenditures.

Noteworthy are precisely those for the Homo Oeconomicus "supposedly irrelevant factors". Rationally it is not important whether consumers pay with cash or, for example, a virtual wallet. On the other hand, numerous studies confirm that the displayed parameters of the decision-making architecture can be reproduced. Thus, they have a predictable effect on the behavior of consumers in real life as opposed to the paradigm of the classical economy.

“Whether we are acting as consumers, businesspeople, or policy makers, understanding how we are predictably irrational provides a starting point for improving our decision making and changing the way we live for the better.”<sup>167</sup> Against this background, Dan Ariely advocates for the introduction of a "self-control credit card" to counter credit card debt.<sup>168</sup> Users could set budgets for their spending. If they exceed their limits, they themselves could decide which "penalty" they must pay; e.g. their credit card could no longer be accepted or a previously determined amount would be transferred to a special account (for example, a retirement account).

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<sup>167</sup> Ariely 2008, p. xx

<sup>168</sup> Here and in the following: Ariely 2015, p. 123

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