

The Pain of Payment: Purely Experimental?



Name: Ties van der Veen

SNR / ANR: u1274563 / 876311

Month & year of graduation: September 2020

Study program: MSc Economics

School name: Tilburg School of Economics and Management (Tilburg University)

Supervisor: dr. L.B.D. Raes

Abstract

This paper discusses pain of payment by reviewing previous research and summarizing where the current research stands. Up until now, researchers have focused on testing this concept in experimental settings only. The current study attempts to find evidence for the pain of paying concept empirically, using demographic and financial data. A dataset containing data on 2165 Dutch households (the DNB Household Survey) is used to test for a relationship between proxies for pain of payment and financial wellbeing. Specifically, measurements for payment methods, consumer behaviour, and subjective and objective income are used. Evidence is found that three consumer behaviour measurements impact on the objective and subjective income of respondents. Implications and future research are discussed.

Acknowledgement: in this paper use is made of data of the DNB Household Survey.

Table of contents

Abstract	p2
Introduction	p4
Research question	p5
Literature review	p6
<i>The pain of paying – core research</i>	p6
<i>Expanding the concept – additions to pain of payment knowledge</i>	p8
<i>Objective and subjective income</i>	p10
Method & analysis	p12
<i>Data and variables overview</i>	p12
<i>Correlation and multicollinearity tests</i>	p15
<i>Regression tests and results</i>	p16
General conclusion & limitations	p22
<i>Future research</i>	p22
References	p23
Appendix	p25

Introduction

In recent years after the expansion of research in behavioural economics, much work has been done on trying to identify the aspects that make up the pain of payment. Its introduction by Zellermayer (1996) and further contribution through for example the ‘Tightwad-spendthrift scale’ (Rick, Cryder & Loewenstein, 2008) has proven that this concept is very much real and worth studying. A notable missing aspect, however, is proof that pain of payment affects people’s finances. The logic is simple: pain of payment is relevant for all purchases. Even though each added piece of research shows that its impact varies depending on the type of purchase, it should still impact every single purchase a consumer makes. Naturally, this should add up over time. Combined with the knowledge that certain attributes of pain of payment (e.g. whether they are a ‘tightwad’ or a ‘spendthrift’ (Rick, Cryder & Loewenstein, 2008)) vary per individual, it should be possible to find evidence for the pain of payment people experience in their finances.

In the upcoming chapters the history and evolution of the research on pain of payment will be explored. Zellermayer’s original paper will be discussed in detail, followed by papers which have increased our understanding of the concept. Last, a summary by Reshadi (2020) will be used as an overview to acknowledge the current status of pain of payment research. Related topics will be woven in inbetween these two main topics.

Upon completing this theoretical overview, I will move into the statistical analysis of this paper. Multiple regressions of two different forms (OLS & ordinal logistic regression) will be used to analyze the data I have access to. Results will be discussed and directions for future research will be given.

Research question

The aim of this thesis will be to explore pain of paying in a different context than what has been considered until now. Experimental studies have been the main way to explore the concept of pain of paying, but this study will try to find evidence for the experimental findings in a purely empirical setting. Thus, we come to the main research question of this thesis:

What is pain of paying and how does it affect the financial situation of Dutch households?

I will attempt to answer this question by first analyzing the existing research on pain of payment. This will be presented in the ‘literature review’ section of the thesis. This section first focuses on the creation of the concept. Second, it will summarize the most important developments through time. Last, it will connect the pain of payment to the dependent variables used in the analysis: objective & subjective income. Following that, I will apply statistical analysis to find evidence for the relationships I suggest. Due to the nature of my research I do not have the same measures as the experimental studies did (which focused mainly on purchasing data at the moment of the experiment). This lead to a specific selection of variables that are closest to the variables used in other studies. I will explain this more in-depth in the ‘Method & analysis’ section.

Literature review

The pain of paying – core research

When making transactions and paying for a product or service, there is a mental cost that needs to be paid next to the monetary one (Prelec & Loewenstein, 1998). Zellermayer (1996) described this effect as “the notion that a consumer who pays for a product or service experiences emotions associated with the act of paying” (Zellermayer, 1996, abstract), and subsequently named this concept ‘the pain of paying’. The more in-depth explanation of this concept he detailed in his paper suggests that it has an effect on several parts of the decision-making process during a transaction.

Zellermayer’s analysis found six impactful product attributes that have an effect on the painfulness of a transaction. These were:

- Fairness (-) (is the purchase justifiable from a monetary & utilitarian point of view)
- Investment (-) versus consumption (+) (future benefits or immediate satisfaction)
- Immediate (-) versus drawn-out (+) (payments once or multiple times)
- Perception of self (+) versus perception of others (-)
- Moment of actual payment (+) (relative to obtaining the service or item),
- The amount of control one has over the purchase (-) (voluntary purchase or forced due to circumstances)
- The currency amount that has to be paid (+)

The way that these attributes affect the pain of payment felt during a purchase is indicated by the – and + signs. Minus signs indicate a negative relationship (e.g. increased fairness decreases the pain of payment experienced). Plus signs indicate a positive relationship (e.g. perceiving a purchase to be for yourself increases pain of payment felt during the purchase). The fact that these attributes are considered by consumers when making a purchase, and that people respond to changes in these, suggest that consumers are risk-averse for consumption-related uncertainty. Risk aversion to many aspects of a purchase has been documented quite often, e.g. payment size and scaling (Holt & Laury, 2005) and product categories, brand choice, and potential loss (Taylor, 1974). This also extends to bigger scale ‘purchases’ such as investments (Epstein & Zin, 1989; Attanasio & Weber, 1989).

Deeper classification was done by dividing these six product attributes into three categories, dependent on which type of theory they are related to. These three classifications were transactions, buffering and coercion. The first term, transaction, refers to the idea that purchases have to feel justifiable. One has to

feel that they are buying something, and that this purchase has the attributes they would expect. Secondly, buffering refers to how strongly a purchase can be connected to a specific product or service. This connection is made such that a consumer can mentally attribute the payment(s) to this. In other behavioural economics papers (e.g. Raghurir & Srivastava, 2008; Prelec & Loewenstein, 1998) this concept is also referred to as 'coupling'. Lastly, the 'coercion' concept relates to situations where a consumer might be compelled to buy an item or service they would not have bought under normal circumstances. They are coerced to make the transaction out of necessity.

Specific classification is also given to various payment methods and their respective pain of paying. Zellermayer (1996) suggests that cash eliminates the pain of paying due to its immediate and visible nature, whereas checks and credit cards cause a recurring effect of the payment (think of it during payment, but also later seeing it on the bank statement for example). Thus, these methods would have a higher pain of paying according to Zellermayer (1996). Later research refines this line of thinking into a concept called 'payment transparency', which incorporates various attributes of a payment method to describe its full effect on people's mental accounting and consequentially pain of payment (Prelec & Loewenstein, 1998; Raghurir & Srivastava, 2008). Shown is that payment methods differ in the moment when consumers recognize that the money is spent, even if they haven't purchased anything yet. Prelec & Loewenstein (1998) identify that people consider money from an ATM spent when consumers withdraw the money, even though they haven't purchased anything with this money yet. Due to this, they spend the withdrawn money with less pain of payment. This is another instance of the coupling concept mentioned earlier; payment is decoupled from the product, reducing pain of payment. Based on this line of thinking, Soman (2003) created a table showing (perceived) transparencies for different payment methods. The methods were classified on a Very Low – Very High scale for four categories: salience of form, salience of amount, relative timing of money outflow and purchase, and overall transparency. It must be noted, however, that this paper did not measure respondents' perceptions of the payment mechanisms and the mentioned categories. Thus, this should only be used as a guideline.

The most transparent method of payment categorized by Soman (2003) was cash. This is the only method that received the label of 'High' transparency. On the opposite end of the scale there are payments that are completely hidden from the consumer. Soman (2003) classified these as 'direct debit from bank accounts'. Zellermayer (1996) also studied these hidden bank deductions. Yet he considered these payments to be similar to cash, as there is again only one moment when the pain of payment is felt. This is where Zellermayer (1996) and Soman (2003) seemingly contradict each other. Zellermayer suggests that the more often people are reminded of their payment, the more painful it becomes. Soman (2003) however suggests that only the relative moment of payment is important. Zellermayer (1996) found conflicting results for his theory (bank deductions increased as pain of payment increased, whereas cash usage increased with a reduction in the pain of payment), making it likely that Soman's (2003) analysis is more accurate. Noted too is the fact that consumers do not base their payment decision

purely on these (affective) considerations; lots of the decision-making is built out of pure habit (Zellermayer, 1996).

Another study conducted within the paper by Zellermayer (1996) tested whether people tend to be on the spending or conserving side when considering monetary transactions. Evidence was found for people to be able to place themselves on a spending-conserving scale in regards to purchasing behaviour. Most people placed themselves more towards the conserving money side, suggesting that people have to pass a certain, possibly (mental) pain related, threshold to spend their money. Also tied into this finding was people's perception; respondents thought that other people spent their own money more freely than the respondent themselves. These two findings confirm the idea mentioned earlier that the pain of payment is not purely related to the pain of a lowered budget, but also has a more psychological aspect to it.

This finding done by Zellermayer (1996) of people being structurally "afraid" of purchases was further developed into the 'Tightwad-spendthrift' scale by Rick, Cryder & Loewenstein (2008). This research focused on finding individual differences between people and their experienced pain of payment. Identification of these differences allowed them to create a scale on which to place these people, going from 'tightwads' with a general high pain of payment experience to 'spendthrifts', people who generally experience less-than-average pain of payment. An additional result the authors found was that the differences in spending between the two groups was minimized when situational factors mitigated the impact of the pain of payment.

Expanding the concept – additions to pain of payment knowledge

Since economists started considering the mental costs of monetary payments, much (experimental) research has been done to shed light on the full extent of this concept. After Zellermayer's paper, multiple other studies have been conducted that tried to measure and identify behavioural and psychological aspects of the pain of paying, some of which we discussed in the previous section. Much more recently, however, Reshadi (2020) summarized the most important research on pain of paying in three essays. In the first of the three, he states that the pain of payment has three causes that have been identified: transaction fairness (sourced from Zellermayer, 1996), opportunity costs (Frederick et al., 2009), and the reduction/spending of a valuable resource (Zhou & Gao, 2008). As we have already discussed transaction fairness (Zellermayer, 1996), let us look at the other two mentioned sources.

The research conducted by Frederick et al. (2009) focused on opportunity costs. They suggest that consumers feel the pain of paying when they pay attention to the opportunities they are giving up for the purchase they are making. In addition to this they suggest that 'tightwads' (in reference to Rick, Cryder & Loewenstein, 2008), people who are reluctant to spend their money, are less affected by this

interaction. This is because they are more likely to think of the sacrificed purchases without being prompted to do so, and thus their base pain of paying is higher than other people.

Reduction of a valuable resource due to spending is discussed by Zhao & Gao (2008). They theorize that social exclusion and monetary loss are painful because people feel that these are buffers against more pain. Thus, a reduction of the buffer lowers the sense of security one has from knowing they have a good buffer, and increases the painful feeling. Related to this is the research done by Xu et al. (2015), who studied the role of perceived and actual social support on pain of payment. They found that both types of social support indeed reduced the pain of payment people feel, and that perceived social support also reduces the perceived importance of money as a buffer for future monetary issues.

Reshadi (2020) further summarizes the moderators of the pain of payment that have been discovered in previous research and divides them into four categories: situational, individual, financial well-being and consumption context. As this is quite a sizable list, I will only discuss ones that can be considered from an empirical point of view with the dataset I have access to.

Of the situational factors (aspects that vary between purchases), Reshadi (2020) cites the research of Soman (2003) regarding payment transparency which was discussed earlier. In line with the theory cited earlier, Reshadi (2020) concludes that the pain of payment is strengthened payment is more salient, through payment methods with higher transparency.

Financial well-being is one of the categories that has a quite straightforward factor included in it: income. As people have lower income, it becomes more painful to spend money (Bagchi & Block, 2011). It is also painful for people to spend their money when it is difficult to earn (Soster, Gershoff & Bearden, 2014). Income impacting the pain of payment is also further expanded upon by Soster, Gershoff & Bearden (2014), who propose the idea of the 'bottom dollar effect'. This effect suggests that consumers are less satisfied with purchases when the payment of the purchase drives their budget down to dangerously low levels, or depletes it. In other words: spending money when one's budget is close to or completely gone increases the pain of payment. Sheehan & van Ittersum (2018) show contextual proof for these findings by studying spending patterns of budget shoppers in grocery stores. These results imply that people's income, budget, and knowledge about future income all play a role in the pain of paying they experience. This is further reinforced by research carried out Berman et al. (2016), who discuss the concept of 'financial slack'. The way people forecast their future spare money, which is what the concept is about, depends on how involved people are with their finances. People who keep better track of their expenditures and budgeting tend to be similar to the 'tightwads' discussed by Rick, Cryder & Loewenstein (2008). Conversely, the 'spendthrifts' from the same paper neglect to keep track of their expenses, and are more affected through their expenses cutting into their savings.

Related to keeping track of expenditures is how well people can actually keep themselves from purchasing goods they do not derive satisfactory utility or hedonic needs from. Research on lack of

impulse control suggests that consumers' self-control is dependent on various factors like individual traits, clarity of the purchasing goals, and amount of self-regulatory demanding decisions in recent memory (Baumeister, 2002). Exerting mental energy to keep oneself from buying unneeded goods is likely to affect the pain of paying, as this gets eroded with multiple purchases in a short time span. Giving in to the impulse to spend even though one knows they should not likely heightens pain of payment, whereas spending when there is no impulsivity involved likely does not heighten pain of payment.

It seems necessary to summarize the most important aspects of pain of paying I have discussed, as the cited research covers a wide variety of causes and moderators. The dataset I am able to work with does not provide measures for all of these relationships, mainly due to the point discussed earlier that most research is done in an experimental setting. For that reason, the main focus of the rest of this paper will be on three aspects of pain of payment. First, I will include the payment method people prefer to use through a measure of (subjective) usage frequency. Second, I will make use of any of the psychological measures for which I have a comparable variable. I will discuss why I think a variable is similar enough to ones used in other papers in the 'Method & Analysis' section. Third, I will use financial measures to see the effects on people's income and budget. The DHS has variables for overall gross and net earnings, and for people's subjective income. The difference between these will be discussed in the next section.

Objective and subjective income

The previous section described how research on the pain of paying has developed. This has shown that it has both subjective (perception relative to others) and objective (measurable regardless of others' value) aspects. Thus, it only makes sense that we measure the pain of payment effect in practice on both of these types of measurements. A useful tool that is available to us is a measurement through subjective and objective income. The idea of income being measurable as both subjective and objective has been confirmed and carried out in previous studies (Ackerman & Paolucci, 1983; Tibesigwa, Visser & Hodkinson, 2016). Measuring income objectively is straightforward: one looks at the income earned by respondents over a specific year. Though this is self-reported, it is still unlikely that people would willfully lie about this. Mistakes in recalling or unwillingness to look up exact amounts should not heavily impact the results, as these would only have minor effects. Especially with the high number of responses in the dataset this should average out.

Subjective income is measured through a question with multiple possible responses, usually on a Likert-scale. This allows for comparisons between people's perceptions and own judgment on their income, rather than a pure numerical evaluation. The relationship between subjective and objective income, psychological systems, and purchasing decisions has been shown on multiple fronts. Links between both income measures and wellbeing have shown that income comparisons affect people's wellbeing, and

that individual characteristics such as age impact this as well (Tibesigwa, Visser & Hodkinson, 2016). On purchasing behaviour, Barber, Almanza & Donovan (2006) show that an important factor in a consumer's decision to purchase a bottle of wine is the packaging and its design. Consumers review this design and base their decision (in part) on their self-confidence about their own choices and their income level.

Overall, we have seen in this literature review that pain of payment can have an impact on both subjective and objective income. This leads us to the following hypotheses to test:

H1: Experiencing higher pain of payment increases objective income

H2: Experiencing higher pain of payment reduces subjective income

The expectation of results in different directions is due to the pain of payment being an affective mechanism. A person who experiences higher pain of payment will have a higher barrier of spending, and thus ends up spending less money. As they are less likely to have a number of expenses or debts that pile up, their income (from all sources as registered in the dataset) should be higher.

The second hypothesis points in a different direction, as a higher pain of payment could make a person feel like their income is not sufficient for various purchases they have to make. Thus, it makes sense that people with higher pain of payment would perceive their income to be lower than people who do not feel this inhibition.

An important thing to note here is that income is obviously something different than people's budget. However, by measuring the effect of pain of payment proxies on both gross and net income, and comparing these to my subjective income measure, I aim to still get a decent view of how pain of payment impacts people's finances.

Method & analysis

Data and variables overview

The dataset used in my analysis comes from the CentER Data institute connected to Tilburg University. It is known as the DNB Household Survey, which is conducted each year among a group of Dutch households. The version used in this thesis is the 2018 data wave, which contains data from 2165 households. Respondents were at least 16 years old, and multiple members from one household could fill out the survey.

The dependent variables included in the regressions are measures for income; two continuous income measures and a subjective income measure in the form of a financial situation survey question scored on a 5-point Likert scale. The continuous income variables, net and gross income, are calculated from a set of questions in the DNB Household Survey. These questions served to find a person's total income over a year (so not just income from a singular job or occupation). For the full list of variables included in this measure, see Appendix Table 7.

Many independent variables are included, as the dataset contains many (yet sometimes imperfect, to be discussed later) measures for aspects of pain of payment. An overview of all relevant variables is shown in Table 1.

Variable name	Description	Sourced/adapted from
btot	Total gross income from all sources – continuous variable	DNB Household Survey (aggregate measure, see codebook list in Appendix Table 7 for full list of factors)
ntot	Total net income from all sources – continuous variable	DNB Household Survey (aggregate measure, see codebook list in Appendix Table 7 for full list of factors)
finsitu	Subjective measure of income. Scaled on a 5-point Likert scale. Ranges from 'I/we are in debt' (1) to 'I/we save a lot of money' (5)	DNB Household Survey, subjective income measuring examples (Ackerman & Paolucci, 1983; Tibesigwa, Visser & Hodkinson, 2016)
pin2	Frequency of PIN usage as payment method. Measured on a 4-point Likert scale. Ranges	Choice of payment method, coupling, and transparency (Prelec & Loewenstein, 1998;

	from 'never or very rarely' (1) to 'very often' (4)	Soman, 2003; Raghurir & Srivastava, 2008)
nfc2	Frequency of NFC usage as payment method. Measured on a 5-point Likert scale. Ranges from 'never' (1) to 'very often' (5)	Choice of payment method, coupling, and transparency (Prelec & Loewenstein, 1998; Soman, 2003; Raghurir & Srivastava, 2008)
intern	Frequency of use of internet-based bank payments. Measured on a 5-point Likert scale. Ranges from 'no' (1) to 'yes, very often' (5)	Choice of payment method, coupling, and transparency (Prelec & Loewenstein, 1998; Soman, 2003; Raghurir & Srivastava, 2008) Transparency based on similarities with other payment methods (Soman, 2003), as this payment method is fairly new.
smart	Frequency of use of application-based bank payments. Measured on a 5-point Likert scale. Ranges from 'no' (1) to 'yes, very often' (5)	Choice of payment method, coupling, and transparency (Prelec & Loewenstein, 1998; Soman, 2003; Raghurir & Srivastava, 2008) Transparency based on similarities with other payment methods (Soman, 2003), as this payment method is fairly new.
cash	Likelihood of someone using cash rather than other payment methods. Constructed from data on the other four payment methods.	DNB Household Survey
transparency	Ordinal measure of how transparent someone's average payment method usage is. Constructed from the other four payment methods.	DNB Household Survey & Soman (2003)

bijhoud	Measure of how well the respondent tracks their expenditures. Tested with a 5-point Likert scale. Ranges from 'I keep no or very bad track of my expenditures' (1) to 'I keep track of my expenditures very well' (5)	Budget considerations and mental accounting (Soster, Gershoff & Bearden, 2014; Sheehan & van Ittersum, 2018; Berman et al., 2016)
beschryf	Measure of risk-taking tendencies of a respondent. Measured on a 5-point Likert scale. Ranges from 'I have taken no risk' (1) to 'I have often taken big risks' (5)	Risk aversion in purchasing decisions (Holt & Laury, 2005; Taylor, 1974). Not a direct measure for consumption risk, but investment risk taken. Not perfect yet still usable, as risk is important in investments as well (Epstein & Zin, 1989; Attanasio & Weber, 1989)
uitgeven	Measure of spending impulsivity versus saving. Measured on a 7-point Likert scale. Ranges from 'I spend my money immediately' (1) to 'I save as much money as possible' (7)	Impulsivity affects consumer behaviour (Baumeister, 2015). This is in turn likely to affect pain of payment.

Table 1: variable names, descriptions, and sources

The 'cash' and 'transparency' variables were not included in the original survey. They are constructs I created from the four original payment method measures (pin2, nfc2, intern & smart). 'cash' is a binary variable, scored (1) when the respondent's answer to the usage of the four payment method variables were at or below their midpoint. Reasoning behind this is that people who use these methods more sparingly are more likely to have another main payment method, of which cash is the most likely one. This variable will be used in upcoming regressions, but only as a replacement for the other four methods (adding them at the same time would introduce multicollinearity).

The 'transparency' variable was made by comparing the four payment methods to the transparency table made by Soman (2003). Straightforward were PIN and NFC: these are done via one's debit card, and thus are likely to have low transparency. Evaluating bank payments via applications (smart) and a bank website (intern) was more difficult, as these methods have risen in popularity in the past few years and

thus have not been scored yet. Going by Soman's (2003) criteria, bank payments via applications (smart) would have a low 'salience of form' and 'salience of amount' as payments via this method are usually done with as few actions as possible, and in a more casual setting. Timing would be concurrent. Thus, I indicate that this payment method will have overall low transparency. Bank payments via the internet (intern), however, would be more likely to score medium on 'salience of form' and 'salience of amount'. This is due to the online environment of these bank websites being more detailed and more comprehensive than their application counterparts. It is also more likely that payments via these sites are conducted in a more committed context, such as on the pc in a study or living room. Timing of the payment would still be concurrent. Thus, I score this payment method as 'medium' transparency. Construction of this variable was done by looking at the frequency with which someone used each payment method, and taking the most likely average transparency for their payments. For example, if someone scored 'pin2', 'nfc2' and 'smart' at a 3 or higher (indicating a frequent level of usage for all these methods), then their transparency would be set to low. If these methods were used less frequently, and payment via bank website (intern) more often, one's transparency would be set to medium. High transparency was used only for people who were likely to be a cash user, as shown in the previous construct.

The reason why I use imperfect measures like income (rather than budget) and various pain of payment proxies rather than one experimentally found variable for pain of payment is twofold. First, I only have the DNB Household Survey to work with; finding more (experimental) data was both not the intention when starting this research. Second, gathering any type of additional data was made quite impossible due to the ongoing situation concerning COVID-19. This means that I can not say anything conclusive about causality between the pain of payment measures and income. The contribution of this study, however, is to push the future research on pain of payment to look at the bigger picture. By analyzing the relationship between income(/budgeting) and pain of payment proxies, I hope to inspire other researchers to look further into these effects. Specifically, I aim to show that it is necessary for researchers to look beyond the experimental setting for pain of payment, and find ways to determine how sizable its impacts on people's finances is.

Correlation and multicollinearity tests

As these measures all join together in looking for evidence for a relationship between people's finances and pain of payment, it has to be certain that the independent variables are indeed independent. I have conducted correlation tests to test for multicollinearity, the results of which can be found in the Appendix, Table 8. The most likely cases where collinearity could occur are variables which have similar attributes. For example, two of the four payment methods included in the regression analyses, PIN and NFC, are both available when using a bank pass (debit card). Thus, it is likely that someone

who has their bank pass with them when they go to make a purchase, they might use both payment methods. This could result in collinearity.

As the values for the correlation outcomes are not close to 1, using these variables together in regressions should not present any issues. To make absolutely sure that multicollinearity is not an issue, however, I also check the variance inflation factor of the first regression. This can be found in the Appendix, Table 9. The values all appear to be close to 1, indicating there is little risk for multicollinearity to affect the interpretation of the regression results.

Regression tests and results

The regressions with the previously discussed variables will be conducted in two ways. For the continuous objective income measures, OLS (ordinary least squares) regression will be used. For the subjective income measure, ordinal logistic regression will be utilized. OLR is used because the subjective income measure is ordinal, making a regression analysis method specifically tailored to studying ordinal dependent variables more useful.

The first regression looks at the relationship between total gross income and the pain of payment proxies (the four payment methods, ‘bijhoud’, ‘beschryf’, and ‘uitgeven’). Its results can be seen in Table 2, column 1.

These results show that only the ‘bijhoud’ and ‘beschryf’ variables are statistically significant, at the 10% and <1% level respectively. Their estimates are respectively (-)2494.1 and 5411.6, meaning that an increase of 1 in these variables changes the respondent’s gross income by this amount (on average). This suggests that people who keep better track of their expenditures have lower gross income, and that people who take more risks have a higher gross total income (again, on average). None of the other variables are statistically significant. In other words: we did not find evidence for any form of payment method influencing people’s total gross income level. This was also the case for the ‘uitgeven’ variable, which measured people’s spending impulsivity.

To validate the findings of this first regression, there are two variations that I test. The first variation is to use the constructed variable ‘cash’ instead of the other payment methods. Results of this regression can be found in Table 2, column 2. These results show a similar outcome to the previous regression; ‘bijhoud’ and ‘beschryf’ are the only statistically significant variables, again at the 10% and <1% level respectively. Their estimates are similar in size and direction as the estimates of the previous regression.

OLS Regression results gross income			
	<i>Dependent variable:</i>		
	btot		
	(1)	(2)	(3)
Constant	19.975,08* (11.498,94)	34.381,85*** (6.517,38)	46.452,00*** (9.720,74)
pin2	1.396,71 (2.132,57)		
nfc2	1.807,18 (1.164,78)		
intern	141,99 (1.392,22)		
smart	400,09 (823,72)		
cash		-7.673,20 (9.318,23)	
transparency			-4.835,14 (4.181,72)
bijhoud	-2.494,09* (1.293,54)	-1.832,96* (1.088,02)	-1.338,84 (1.542,16)
beschryf	5.411,59*** (1.327,85)	5.156,67*** (1.112,44)	4.576,78*** (1.526,95)
uitgeven	847,65 (1.259,13)	37,37 (1.051,70)	-1.046,22 (1.575,60)
Observations	538	685	280
R ²	0,05	0,04	0,04
<i>Note:</i>	* p<0,1; ** p<0,05; *** p<0,01		

Table 2: OLS regression results for the 'gross income' dependent variable

The second variation uses the 'transparency' variable, instead of the 'cash' variable. These results can be seen in Table 2, column 3. The outcome of this regression is slightly different than the previous two. While the 'transparency' variable is not significant by itself, its inclusion has caused 'bijhoud' to not be statistically significant anymore. 'beschryf' still retains its significance (yet at the higher 1%-level), with a similar estimate.

The next set of regressions is similar to the first, but the dependent variable is total net income. Its results are shown in Table 3, column 1. In this regression, the results change in a minor way from the previous set of regressions. While both 'bijhoud' and 'beschryf' are still significant at the 10% and <1%-level respectively, the 'smart' variable has now joined them, being significant at the 10%-level. Estimates for 'bijhoud' and 'beschryf' are a bit smaller due to net income obviously being lower than gross income. 'smart' has quite a small estimate comparatively, being about 1/3rd of 'beschryf'. This estimate value means that for each increase of 1 in the level of application usage frequency, net income increases with 1037.5 (on average). This implies that people who do their payments through bank applications via their smartphone or tablet have a higher total net income. The significance difference between the gross and net total income of the 'smart' variable is something we can speculate about at best. It is not likely to have happened due to too few observations, as the number of remaining observations is 471. It is possible that the lower values of the dependent variable (due to the difference between gross and net income) have made the variation from 'smart' more impactful.

The variations on the first regression will also be applied to the second regression. First, the variant where 'cash' replaces the four payment methods. This can be seen in Table 3, column 2. This regression is very much in line with the previous version of this regression. Both 'bijhoud' and 'beschryf' are significant, at the 5% and <1% level respectively. Their estimates increase in size, with 'bijhoud' reporting at (-)2097.1 and 'beschryf' at 3435.2. Their meanings remain similar to what was reported before. As this regression had more observations (600) compared to the previous one (471), the increase in estimates could be due to higher accuracy with taxed income values.

The second variant applied to the second base regression can be found in Table 3, column 3. Similar effects occur in this version when compared to its previous iteration: 'beschryf' is the only statistically significant variable that remains (at the <1%-level), with its estimate barely changed. The number of observations in this regression was 243.

OLS Regression results net income			
	<i>Dependent variable:</i>		
	ntot		
	(1)	(2)	(3)
Constant	16.431,54* (8.524,61)	32.625,81*** (5.341,01)	34.441,02*** (7.033,71)
pin2	246,52 (1.566,54)		
nfc2	987,74 (878,49)		
intern	676,43 (1.020,58)		
smart	1.037,52* (607,32)		
cash		-5.910,47 (7.869,06)	
transparency			-3.336,49 (3.084,30)
bijhoud	-1.891,42* (985,79)	-2.097,15** (901,56)	156,36 (1.110,13)
beschryf	3.124,44*** (989,23)	3.435,25*** (905,68)	3.543,71*** (1.125,91)
uitgeven	812,63 (973,63)	-453,65 (885,48)	-1.344,93 (1.179,17)
Observations	471	600	243
R ²	0,05	0,04	0,05
<i>Note:</i>	* p<0,1; ** p<0,05; *** p<0,01		

Table 3: OLS regression results for the 'net income' dependent variable

The third set of regressions looks at the dependent variable 'finsitu', which measures people's perception of their financial situation on a scale of 1-5, which ranges from (1) 'I/we are in debt' to (5) 'I/we save a lot of money'. The results, shown in Table 4, show the ordinal logistic regression with 'finsitu' as dependent variable.

**Ordinal Logistic Regression results
subjective income - base version**

	Value	Std. Error	t value	p-value
pin2	0.158	0.128	1.235	0.217
nfc2	0.065	0.071	0.915	0.360
intern	-0.073	0.086	-0.847	0.397
smart	0.051	0.051	1.009	0.313
bijhoud	-0.038	0.079	-0.478	0.633
beschryf	0.168	0.082	2.056	0.040
uitgeven	0.317	0.076	4.192	0.00003

Table 4: OLR results for subjective income, base version

Variables ‘beschryf’ and ‘uitgeven’ show to be statistically significant, at the 5% and 1%-level respectively. Their estimates are both positive, suggesting that a one-unit increase in these variables (for ‘beschryf’: taking more risks, for ‘uitgeven’: moving towards a saving impulse rather than a spending impulse) increases the likelihood of people perceiving themselves as saving a lot. The estimates are rather small on a 1-5 scale, with values of 0.168 for ‘beschryf’ and 0.317 for ‘uitgeven’. The most notable difference between this regression and the previous two sets is that ‘bijhoud’ does not seem to have a significant effect on people’s subjective income. The ‘uitgeven’ variable, on the other hand, has now become statistically significant whereas it was not impactful before. The number of observations was 592.

Applying the first of the two variations from the previous two regressions results in the regression seen in Table 5. Similarities with the previous regression; ‘beschryf’ and ‘uitgeven’ are once again significant at the <1%-level. Their estimates are very similar to those in the previous regression: 0.195 & 0.308. Replacing the four payment methods with the ‘cash’ variable had little impact. The number of observations was 763.

**Ordinal Logistic Regression results
subjective income - cash version**

	Value	Std. Error	t value	p-value
cash	-0.257	0.503	-0.511	0.609
bijhoud	-0.029	0.070	-0.412	0.681
beschryf	0.195	0.071	2.728	0.006
uitgeven	0.308	0.065	4.742	0.00000

Table 5: OLR results for subjective income, cash version

The second variation applied to the third base regression produces the results which can be seen in Table 6. The addition of the ‘transparency’ variable affects the significance level of ‘beschryf’: it is now just

barely statistically significant at the 10%-level. The ‘uitgeven’ variable remains at the <1%-level. While the estimate for ‘beschryf’ only increased by a small amount (to 0.192), the estimate for ‘uitgeven’ climbed to 0.456. Thus, a one-unit increase in ‘uitgeven’, a higher tendency to save, would increase people’s subjective satisfaction about their income by about 0.456 on average. Number of observations was 305.

Ordinal Logistic Regression results				
subjective income - transparency version				
	Value	Std. Error	t value	p-value
transparency	-0.283	0.260	-1.088	0.277
bijhoud	0.075	0.111	0.675	0.500
beschryf	0.192	0.112	1.714	0.086
uitgeven	0.456	0.112	4.077	0.00005

Table 6: OLR results for subjective income, transparency version

Taking all of these regressions together, I must conclude I cannot find evidence for payment method usage affecting people’s objective and subjective income level. The three other variables ‘bijhoud’, ‘beschryf’ and ‘uitgeven’, however, were all statistically significant through multiple regression variations. In the objective income measures (gross and net income), an increase in keeping track of expenditures decreased gross and net income, whereas an increase in risk taking (in investments) increased it. In the subjective income measure, an increase of risk taking (in investments) increased someone’s subjective income slightly. Here, a tendency to save money increased respondents’ subjective income more sizably, in particular when the transparency measure was included in the model.

Specifically looking at H1 & H2, I cannot reject the null hypotheses. While parts of my research findings are in-line with the predicted hypotheses for H1 (increased risk in investments leading to higher objective income), I cannot say this for H2.

General conclusion & limitations

This research has attempted to provide empiric evidence that has been missing for the concept of pain of payment. Previous research only addressed this concept in experiments, neglecting the real-world side of the matter. Cited theory shows that much evidence about pain of payment and its influencing factors can be found in experimental research. However, little of this research attempts to place these findings in a real context where its effects can be measured beyond the moment of the transaction. In multiple regressions and through logical deductions I have attempted to show a way to find evidence for pain of payment in people's financial situation, both via objective and subjective measures. While evidence for payment methods affecting the respondents' income levels (and thus pain of payment) was not found, three behavioural measures were identified in having an effect in different contexts. Through the literature review I have attempted to answer the first part of the research question. By giving an overview of the core of pain of paying and the subsequent research up until now, I attempted to sketch an as complete as possible view of pain of payment. By following this up with my own research and analysis, I answered the second part of the research question as best I could. The results mentioned just now conclude the second part of the answer to the research question.

Limitations present in this research are of varying degrees. Most impactful are the imperfect measures in the dataset. Due to my work with the DNB Household Survey, which was not made specifically for this empirical research, and the impossibility of obtaining fresh experimental purchasing data due to the state of the world at present, my measures were lacking. While I have tried to shape them the best I could, and carefully interpreted the regression results, this no doubt affects the scientific accuracy of this thesis. Other limitations include little preceding knowledge on pain of payment in the context of household finances, and thus no certainty of control variables or interaction effects I should have taken into account.

Future research

This thesis has shown that it is important for researchers to apply the existing knowledge on pain of payment in a different way. Experimental research on this concept must continue, but not without acknowledging the fact that pain of payment can be made visible in people's earnings and spending. A way to tackle this issue is by merging the two approaches: conducting an experiment on the pain of payment and gathering financial data from respondents. While this asks much of respondents, it would also considerably increase the veracity of the findings. One could potentially employ a longitudinal study, for example by cooperation with the DNB Household Survey which is taken yearly. If respondents agree to participate in the experiment, one could match the data from the DHS to their data in the experiment. Doing decoupled research and trying to bring both worlds together is quite difficult, as became apparent in this thesis.

References

- Ackerman, N., & Paolucci, B. (1983). Objective and subjective income adequacy: Their relationship to perceived life quality measures. *Social Indicators Research*, 12(1), 25-48.
- Attanasio, O. P., & Weber, G. (1989). Intertemporal substitution, risk aversion and the Euler equation for consumption. *The Economic Journal*, 99(395), 59-73.
- Bagchi, R., & Block, L. G. (2011). Chocolate cake please! Why do consumers indulge more when it feels more expensive?. *Journal of Public Policy & Marketing*, 30(2), 294-306.
- Barber, N., Almanza, B. A., & Donovan, J. R. (2006). Motivational factors of gender, income and age on selecting a bottle of wine. *International Journal of wine marketing*.
- Baumeister, R. F. (2002). Yielding to temptation: Self-control failure, impulsive purchasing, and consumer behavior. *Journal of consumer Research*, 28(4), 670-676.
- Berman, J. Z., Tran, A. T., Lynch Jr, J. G., & Zauberger, G. (2016). Expense neglect in forecasting personal finances. *Journal of Marketing Research*, 53(4), 535-550.
- Epstein, L. G., & Zin, S. E. (1989). Substitution, risk aversion and the temporal behavior of consumption and asset returns: A theoretical framework. *Econometrica*, 57(4), 937-969.
- Frederick, S., Novemsky, N., Wang, J., Dhar, R., & Nowlis, S. (2009). Opportunity cost neglect. *Journal of Consumer Research*, 36(4), 553-561.
- Holt, C. A., & Laury, S. K. (2005). Risk aversion and incentive effects: New data without order effects. *American Economic Review*, 95(3), 902-912.
- Prelec, D., & Loewenstein, G. (1998). The red and the black: Mental accounting of savings and debt. *Marketing science*, 17(1), 4-28.
- Raghubir, P., & Srivastava, J. (2008). Monopoly money: The effect of payment coupling and form on spending behavior. *Journal of experimental psychology: Applied*, 14(3), 213.
- Reshadi, F. (2020). Three Essays on the Effect of Pain-of-Payment on Consumers' Financial Decisions.
- Rick, S. I., Cryder, C. E., & Loewenstein, G. (2008). Tightwads and spendthrifts. *Journal of consumer research*, 34(6), 767-782.
- Sheehan, D., & Van Ittersum, K. (2018). In-Store Spending Dynamics: How Budgets Invert Relative-Spending Patterns. *Journal of Consumer Research*, 45(1), 49-67.
- Soman, D. (2003). The effect of payment transparency on consumption: Quasi-experiments from the field. *Marketing Letters*, 14(3), 173-183.

Soster, R. L., Gershoff, A. D., & Bearden, W. O. (2014). The bottom dollar effect: the influence of spending to zero on pain of payment and satisfaction. *Journal of Consumer Research*, *41*(3), 656-677.

Taylor, J. W. (1974). The role of risk in consumer behavior: A comprehensive and operational theory of risk taking in consumer behavior. *Journal of marketing*, *38*(2), 54-60.

Tibesigwa, B., Visser, M., & Hodgkinson, B. (2016). Effects of objective and subjective income comparisons on subjective wellbeing. *Social Indicators Research*, *128*(1), 361-389.

Xu, Q., Zhou, Y., Ye, M., & Zhou, X. (2015). Perceived social support reduces the pain of spending money. *Journal of Consumer Psychology*, *25*(2), 219-230.

Zellermayer, O. (1996). The pain of paying. *unpublished dissertation, Department of Social and Decision Sciences, Carnegie Mellon University, Pittsburgh, PA.*

Zhou, X., & Gao, D. G. (2008). Social support and money as pain management mechanisms. *Psychological Inquiry*, *19*(3-4), 127-144.

Appendix

List of variables that make up gross and net income

variable name	description
NOHHOLD	household index
NOMEM	index of the member of the household
IB	calculated income tax
WINST	profits [gross]
OG	real estate income/letting of rooms [gross]
HPREM	premium for subsidized purchase of house [gross]
BEURS	government scholarship [net]
STUDLEN	study loan [net]
ALIM	alimony from spouse [gross]
ALIK	alimony for children [net]
OTOEL	parental support for studies [net]
FTOEL	support from family [net]
RENTE	interest/dividends/other income [gross]
ERF	inheritance [net]
ZKP	premium private medical insurance
HS	rent allowance [net]
HG	allowance to adjust to new rent [net]
HWF	rateable value of accommodation [gross]
HTR	mortgage interest payments [gross]
LOON	pay/salary [gross]
VUT	early retirement benefits [gross]
WG	unempl. benefits civil servants [gross]
PENS	retirement pension/annuity [gross]
WW	unemployment benefits [gross]
ZW	illness benefits [gross]
ZORG	care support [gross]
K_OP	children support [gross]
KGB	kindgebonden budget [gross] (Dutch)
WAJONG	disability benefits for persons who were already disabled at the age of 17 and therefore could not work [gross]
WAZ	disability benefits for self-employed, their partner/freelancers/clergymen etc. [gross]
WAO	disability benefits [gross]
IOAW	benefits for elderly and partly disabled unemployed/self-employed [gross]
ABW	social assistance (us: welfare)/benefits for self-employed [gross]
AOW	general old-age pension (us: social security payments) [gross]
AIO	aio-uitkering [gross] (Dutch)
AWW	general widows' and orphans' pension [gross]
ZVWPREMIE	sick fund premium/iza-premium
BTOT	total gross income
NTOT	total net income
HEFKORT	considered tax credit
BOX3TAX	considered income tax box 3 (saving and investments)

Table 7: List of variables used to construct the gross and net income variables, as listed in the DNB Household Survey Codebook (English, version 2018).

Collinearity tests

Variables	Pearson's correlation values
pin2*nfc2	0.4547375
pin2*smart	0.2577802
pin2*intern	0.2334008
smart*nfc2	0.3570075
intern*nfc2	0.06675465
smart*intern	0.0675343
bijhoud*uitgeven	0.19534

Table 8: collinearity testing values. Only variable pairs included that could either logically or through their value be an issue.

Multicollinearity test

Variable	VIF value
pin2	1.224240
nfc2	1.303371
intern	1.039960
smart	1.124029
bijhoud	1.073474
beschryf	1.020651
uitgeven	1.075479

Table 9: VIF value for variables in regression 1 (Table 2, column 1).