The impact of feedback type regarding spending behavior on shaping spending credit-card behavior

Authors: GERARD BORRULL, JORDI FARRERAS, MARTA HERNÁNDEZ, MINERVA RIVAS
Supervisor: Dr. GERT CORNELISEN

UNIVERSITAT POMPEU FABRA
June 2014
Abstract

Payment methods have been proven to affect spending behavior. More precisely, when individuals use credit cards tend to overspend and to underestimate their past expenses. However, there is little research about the role that the additional services provided by financial institution have in shaping consumption patterns. This paper analyze how one of these services – the text message that banks send to their clients each time they make a payment using a credit card – affects spending control. A review of the previous literature is considered, and an experiment is hold to show support for the proposed theoretical framework. Our findings suggest that the information stated in these SMS are a source of variance in the overall expenses.

Key words: payment methods, credit cards, SMS, mobile banking, spending behavior, spending control, loss aversion, past expenses recall, risk aversion.
## INDEX

1. INTRODUCTION .................................................................................................................. 1
2. LITERATURE ..................................................................................................................... 3
3. METHODOLOGY OF DATA COLLECTION ........................................................................... 9
   - Method Participants ...................................................................................................... 9
   - Design and Procedure ................................................................................................. 9
4. RESULTS .......................................................................................................................... 15
5. GENERAL DISCUSSION AND CONCLUSIONS .............................................................. 21
   - Discussion and further research ............................................................................... 21
   - Conclusions .................................................................................................................. 23
6. REFERENCES .................................................................................................................... 24
7. ANNEX. ELECTRONIC SURVEY ..................................................................................... 26
I. INTRODUCTION

Credit cards\(^1\) represent the major economic phenomenon society is facing nowadays. By 1995, credit cards had already surpassed cash as a method of payment (Bar-Gill, 2004). In 2012, consumers used 1.167 billion credit cards\(^2\), i.e. almost 13 cards per household\(^3\). The total number of credit card transactions in the U.S in 2012 was 26.2 billion, i.e “almost 70% of all noncash payments” (Federal Reserve, 2013). And the data for Europe follows the same patterns. Not only is this payment mechanism important, it is also dangerous. The average American debt in 2012 per credit card that is usually carried out is $8,220, i.e the number of Americans who carried credit card debt from month to month is almost 39 percent\(^4\).

“I’m in debt. I am a true American.” - Balki Bartokomous\(^5\)

There is vast evidence that consumers are making less use of cash, while the use of electronic payment methods and the e-commerce continues to increase. Thus, the credit card industry is experiencing a noteworthy growth rate.

It is important to remark that, although this expansion in the credit card industry, little research has been done about how these new payment methods have affected consumer behavior. For example, since the 1970’ there has been growing data confirming the conjecture that credit cards encourage overspending. Research papers such as

\(^1\) The term “credit card” was first used by Edward Bellamy in 1887 in his novel “Looking Backwards”.

\(^2\) The data about credit card holders can be found in the U.S Census Bureau: https://www.census.gov/compendia/statatab/2012/tables/12s1188.pdf

\(^3\) The number of American households can be found in the U.S Census Bureau: http://www.census.gov/hhes/families/data/households.html


\(^5\) Balki Bartokomous is a fictional character on the sitcom Perfect Strangers that aired from 1986 to 1993 in the U.S.
Hirschman (1979) proved that people makes larger purchases in department store when using credit card than when using cash or checks, or Soman (1999) that evidenced that credit card users are more likely to underestimate or forget the amount spent on recent acquisitions. However, the cognitive reasons behind it remind vastly unexplained.

Financial institutions are starting to offer a technology that enables them to provide to their customers a service over their mobile phones using SMS messages. This service are seen as a security tool that alerts the client about every event that happens in the individual’s bank account, such as a large withdrawal of funds or any payment done using the customer’s credit card. Despite that, it is possible to think that this SMS-service and the information displayed on the text message have implications in spending behavior further the ones about bank account security.

This paper seeks to frame the spending with credit card behavior using insights from behavioral and evolutionary psychology, and to offer a fresh perspective on the effects that SMS-banking might have on curving the indebtedness epidemic that affects the global economy.

The rest of this paper is divided into five sections. First, relevant literature is reviewed, a behavioral and evolutionary framework is developed, and the hypotheses about how SMS moderate the effect of overspending created by the use of credit card as a payment mechanism are proposed. Second, the experiment used to test these hypotheses is explained along with the theoretical reasons behind the features of the experiment created. Third, the results are described along with the quantitative tests conducted to check for the hypothesis stated and the relation among the variables. Fourth, the results
are explained employing the theoretical framework provided in the first section. Fifth, and last, limitations, conclusions and directions for further research are discussed.

II. LITERATURE

This section will highlight the link between evolutionary psychology and consumption pattern and to provide the framework for understanding many of our consumption behavior. Also, different streams of literature about paying mechanisms and how those tools affect individual’s willingness-to-pay will be described together with the questions that can arouse in the academic papers discussed. These questions will be captured in the hypothesis formulated below.

Rather than viewing consumption choices as a rational economic evaluation of utility maximization, where individuals take into account the trade-off between the (dis)utility of the payment and the utility given by the product (Prelek and Loewenstein, 1998) it has been pointed out that these can be recast using evolution-based theories. Furthermore, there are many different ways by which evolutionary psychology can provide unique contributions to the field of consumption behavior (Saad and Gill, 2000, and Saad, 2005).

Evolutionary psychology proposes that much of our behavior can be triggered down by internal psychological mechanism; because of the ancient interaction with a hostile environment. All in all, this discipline suggests that human cognitive structure evolved to solve particular adaptation problems, related to reproduction and surviving.

---

Saad and Gill (2000) was one of the first papers that linked evolutionary psychology with consumer behavior.
There are numerous examples that validate the assumptions and findings asserted by the evolutionary psychology. One of these examples has been pointed out by many different papers⁷ which concluded that men are much more risk-seeking than women when choosing insurances, stocks and investing. However, these papers also had difficulties in finding the reason behind it. Form an evolutionary standpoint, ancestor women used to be picky when choosing a partner, because their cost of baring the children was much higher than the cost bearded by men. Therefore, ancestor women took into account the ability to acquire and share resources that men expressed by physical characteristics but also expressed by a high social status⁸.

In conclusion, if men are much more risk-seeking than women is because they needed to achieve resources as much as they could if they wanted to procreate.

What is important to note about the example explained above is that all types of behavior can be best described in terms of adaptive psychological mechanisms addressed to solve problems that humanity faced at one time (Tooby and Cosmides 2005).

However, these cognitive heuristics, even though were adaptive in ancestral environments, may not be adaptive now. Since these cognitive tools were suited to an ancestral environment, the current one create a new and different mismatch between our perfect ancestral reaction and the one we should have for this modern times. In other words, nowadays individuals engage in some behaviors that can be characterized as self-destructive, but that were reasonable thousands of years ago.

---

⁷ Papers such as Nelson (2002) or Harris and Jenkins (2006)
⁸ Status was used to show the level of wealth that men had. By having a determinate level of status men had more chances to be chosen by women, because this implied having more wealth, and thus, more safety and welfare for their children.
A clear example of how strong these mismatches can affect our daily lives is obesity. Based on the latest estimations at European countries, obesity affects the 30% of adults\(^9\). From an evolutionary point of view, junk food craving are linked to prehistoric times when our ancestors needed high-caloric food in order to survive days without finding anything to hunt. That is why we are programmed to enjoy fatty and sugary substances rather than vegetables or fruits. So, today we still have this cognitive mechanism, which is a mismatch that not only creates disputes between mothers and their kids about what to eat for lunch, but also a huge political and healthcare problem.

But the most important mismatch is called “*endowment effect*”, also known as divestiture aversion. “After about a decade of testing, if not more, economists decided that the phenomenon called the endowment effect is indeed robust”. This effect is the hypothesis that we value more things merely because we own them. Simply put, we are willing to pay more money to keep a good rather than paying in order to keep a good rather than paying in order to obtain the same exact one.

If we try to assess this mismatch with a rational economic theory, the results will be disastrous because it is assumed that consumer hold constant well-defined preferences that cannot be change by the pure state of ownership. But our preferences do change. That is the reason why when we go to a store the sellers wants us to try the product, or to wear it. Or some car sellers let us use the car for a few days. Sellers and advertisers had known this effect for decades, but economists could not explain it until they started to use a psychology-based explanation: the pain of losing, or loss aversion\(^{10}\).

---


\(^{10}\) Kahneman and Tversky (1984) proposed an explanation for the divestiture aversion called loss aversion
People are loss averse: this means that they weight losses heavily than gains. This mismatch can be explained from an evolutionary standpoint: avoiding any single negative experience. A broken leg while hunting was much deceiving and death threatening, than the possible gain of risking to find food. So, after all, individuals tend to value losses as more important than gains.

![Diagram of Loss Aversion](image)

**Figure 1.** A graphical representation of Loss Aversion. Own elaboration

From a rational old schooled perspective, in contemplating whether or not to make a purchase, individuals might acquire a good if the “net transaction value”\(^\text{11}\) is greater or equal to zero. The absolute value should only depend on the product itself, not on the payment mechanism, the function of the context, nor the way the information is presented.

Although the payment tool used should not have any role in a rational economic decision-making process, not only Hirschman (1979) and Feinberg (1986) but also other researchers such as Tokunaga (1993) suggested that consumer who predominantly use credit cards overspend relative to those who do not. That is, the willingness to pay is greater in a credit-card situation than in a cash condition.

\(^{11}\) The net transaction value is calculated with the following formula: \(\text{utility(good)} - \text{cost(good)}\).
However, there is little understanding of the specific role that the payment mechanism plays in influencing future spending behavior even though it is widely accepted that the main detonator is related to the past expenses recall.

Past expenses have been proven to have a high influence on consumption behavior in future spending by affecting the perception of available budgets. Past payments strongly reduce purchase intention when the consumer recalls his decreasing budget. Thus, when the payment mechanisms requires an immediate shrinkage of the individual’s cash-budget, he feels this decreasing in his budget heavily than if he pays with credit-card. Paying with this mechanism results in a weaker memory trace which leads to a weaker aversive impact of physically giving away your own budget. Hence, underestimating past expenses at the time of making a consumption decision, induce consumers to have a higher likelihood of making an additional purchase.

Consequently, if the different levels of spending of each payment mechanism have its origin in recalling past expenses, the individuals can assess this payment mismatch with a set of tools. As a deduction, one of them can be the text message (SMS) banks are currently sending to some of its clients to let them have a control over the purchases made with their credit card. These SMS banking system, also called SMS-banking\(^\text{12}\), can be seen as a reminder of the immediate-past expenses because as the individual incurs in a wide variety of expenses over the day, it becomes relatively difficult to keep an account of all of them without having any type of reminder. However, the effect is not statistically large as the information in those SMS is exactly the same as the one stated in the bill of the product.

\(^{12}\text{SMS-banking is a type of mobile banking. Mobile banking is a “system that allows customers of a financial institution to conduct a number of financial transactions through a mobile device such as a mobile phone or personal digital assistant” - Barnes and Corbitt (2003)}\)
Thus, after taking into account all the previous literature, this paper addresses the following specific questions:

- Do SMS-banking influence spending behavior?
- Do the information stated in the SMS influence spending?
- Do individuals who receive the SMS recall their expenses more accurately?
- What theoretical mechanisms accounts for these differences?

These questions are captured in the following hypothesis:

**H1**: Consumers who have a reminder of how much they had been spending will purchase a lower -but not statistically significant- monetary amount than those consumers who do not receive a text message.

**H2**: Consumers who receive a detailed text message will spend less than those consumers who receive a simpler SMS.

**H3**: Consumers who receive text message will recall their past expenses accurately than those who do not receive any message.

In this section, the academic background has been introduced. The motivation that explains the hypotheses and the hypotheses themselves have also been described. In the next session presents the methodology of the data collection with detail and all the procedures that has been adopted to carry out the experiment.
III. METHODOLOGY OF DATA COLLECTION

In this section, it will be described the data used and the electronic survey created in order to test our hypothesis. We have conducted an experiment to see to the extent to which the monetary quantity spent in Euros with a credit card is affected by the feedback received from the bank in the form of a text message.

The idea of SMS-banking is not out of the blue, as most of current banking companies use this short message service in order to provide feedback to their customers whenever they make a payment using their card.

Method Participants

The data used is a sample of 386 respondents, 185 of them were males (48%) and 201 (52%) were females with a mean age of 23.1 years old, from twenty eight different countries; 80% from Spain and the 20% mainly from Australia, Italy, the Netherlands and Peru among others.

Design and Procedure

The monetary quantity spent in Euros with a credit card is the dependent variable of this experiment, and the feedback the subjects are going to receive is the independent one.

In order to test if the type of SMS feedback banks use nowadays has an impact in the credit card behavior of individuals and up to which point this behavior will be better addressed with another type of message, the independent variable has been manipulated creating three different groups.
The first group is the “control group”- a group separated from the rest of the experiment sample where the independent variable being tested cannot influence the results. In this experiment, the control group does not receive any feedback after they make a credit card payment. In the second group, the participants receive a text message stating the amount spent after any time they make a purchase. In the last group, the third one, participants receive a text message stating the amount spent and the money left in their balance account.

Figure 2: Text message displayed in the electronic survey after each purchase from Group one, Group two and Group three (from top to bottom, respectively)
To assess this experiment, an electronic survey has been programmed using a survey builder webpage named Qualtrics\textsuperscript{13} with one of the accounts that the PhD researchers from the Universitat Pompeu Fabra have. This has been done taking into account the technical impossibilities of sending SMS to the participants in group two and three each time they do a purchase.

The major benefits of an electronic survey are: the possibility to collect data from a large number of respondents in order to improve the significance of our results, a lower cost than ruling a field experiment and that can be conducted remotely to prevent for geographical dependence.

However, a survey has also some major drawbacks too that has to be considered in order to reach truthful and not bias conclusions. Thus, the most difficult and important task to achieve in this survey is to make participants to behave as if they were in a real life shopping situation. To do so, the most important feature is that survey-takers think about the money as if they had earned it. And the second most important one is to create in the participants the feeling that they need or want to buy the products offered by the survey.

In order to achieve those two statements, the survey follows a story. In the first few steps of the survey, the participants have to solve some question about Geography “because they are applying for a paid-job as a cartographer and their future boss wants to know their level of knowledge in order to be able to offer them the most suitable job”. Geography is not the main issue here. Those questions are asked in pursuance of making the participants believe that they are actually earning the money to make them

\textsuperscript{13} Qualtrics is a private research software company that enables users to do many kinds of online data collection and analysis including market research, customer satisfaction and loyalty, product and concept testing, employee evaluations and website feedback. Quantitative statistical analysis performed with Qualtrics is cited in a number of professional and academic journals and books. <http://www.qualtrics.com/>
behave as realistic as possible. In the interest of making the results of the spending reliable and comparable through the whole sample, all the participants are offered the same position and same wage by their employer, even though they do not know that.

The story\textsuperscript{14} proposes a scenario were the participant has worked in the company “Maps and Flags\textsuperscript{15}” for several months to be able to go on holidays in Menorca. The participant has been able to save €475 that he will be able to spend there. In other words, the budget constraint the surveyed person will face is €475 overall with the possibility of going on debt – his card is a credit card one. Menorca, as it is explained and rephrased several times during the survey, is a “free cash island”: people cannot use cash there nor other type of payments different from credit card\textsuperscript{16}.

To make it as real as possible, and to make the individual behave as if he was actually on holidays, the survey then follows the daily life of a person who had gone to Menorca with his friends. This implies buying products such as sun scream, or dinner, renting a house and a car, go hiking, and further more goods (see Table of products below). The goods the participant has to choose from are another attempt to make them feel they were in a realistic situation and not in a survey scenario.

All products were chosen to avoid interferences that could lead to non-reliable or even unrealistic conclusions. Therefore, all the products are sex-neutral – any type of clothing was offered - all the set of products to choose from have the same color to avoid preferences merely on the color rather on the quality-price feature and all have the

\textsuperscript{14} In order to read the whole detailed story which was shown through different screens to the participants of the survey, see <https://pompeufabraeeec.eu.qualtrics.com/SE/?SID=SV_9KsustNfXRH2evX> and Annex 1: Electronic survey

\textsuperscript{15} “Maps and Flags” is a fictional company dedicated to create geographic maps for scholar books.

\textsuperscript{16} If participants think that they can pay with cash, the feedback they will receive (group two or three) will not affect the dependent variable and we will not be able to extract any reliable conclusion of it. That is why the survey makes it clear that all the purchases are made by credit card.
same dimensions in the screen to avoid interferences on purely visual attraction effects due to the size of the image.

The price of each good is the real one. This is done to avoid participants to choose any product only because of an artificial price setting scheme. Moreover, in order to make the situation more realistic, all the products have known brand names.

<table>
<thead>
<tr>
<th>Product</th>
<th>Low Price</th>
<th>Medium-low Price</th>
<th>Medium-high Price</th>
<th>High Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Apartment Rent</td>
<td>€130</td>
<td>€168</td>
<td>€180</td>
<td>€244</td>
</tr>
<tr>
<td>2 Solar Cream</td>
<td>€13,95</td>
<td>€14,50</td>
<td>€15,40</td>
<td>€16,36</td>
</tr>
<tr>
<td>3 Sunglasses</td>
<td>€41</td>
<td>€68</td>
<td>€87</td>
<td>€119</td>
</tr>
<tr>
<td>4 Frozen Pizza</td>
<td>€9,45</td>
<td>€13,5</td>
<td>€13,75</td>
<td>€14,75</td>
</tr>
<tr>
<td>5 Backpack</td>
<td>€33,34</td>
<td>€50,45</td>
<td>€70</td>
<td>€92</td>
</tr>
<tr>
<td>6 Fast Food</td>
<td>€4,3</td>
<td>€5,10</td>
<td>€7,40</td>
<td>€8,70</td>
</tr>
<tr>
<td>7 Flip-flops</td>
<td>€3,90</td>
<td>€10,99</td>
<td>€17,95</td>
<td>€28</td>
</tr>
<tr>
<td>8 Hiring a car</td>
<td>€39,4</td>
<td>€50,45</td>
<td>€61,8</td>
<td>€68</td>
</tr>
<tr>
<td>9 Beach Towel</td>
<td>8</td>
<td>€12</td>
<td>€20</td>
<td>€34</td>
</tr>
</tbody>
</table>

The survey-takers are assigned randomly to one of the three groups by the electronic survey\(^\text{17}\) in order to avoid selection biases:

**Group 1**: the story involves eight different situations that the surveyed person faces. In these different situations the participant is asked to choose to purchase a product out of four similar products. After purchasing a good, the participant does not receive any text message feedback. The survey goes to the next product they have to buy. And so on and so forth.

\(^{17}\) The survey has been programmed using HTML coding and the Survey Flow options offered by Qualtrics.
In plain English, group one are those people who do not have the text banking service provided by their banks.

**Group 2:** the story involves the same eight different situations and the same reasoning than group one. Notwithstanding, after purchasing a good, the participant does receive a SMS-feedback stating the monetary amount spent (independent variable). Group two are those people whose banks provide the regular SMS-banking system.

**Group 3:** the pattern is the same as for the other groups mentioned above and together with group two; the participant in group three does receive a feedback in a text-message form stating the monetary amount spent. Nonetheless, it also provides information of his balance account taking into account the amount of all his previous purchases\(^\text{18}\) (independent variable).

The last part of the survey is the exact one for the three groups. The survey asks the participant to guess the total monetary amount he had spent during the survey because the survey wants to asses if the control group reminds their expenses less accurate than the groups which receive any type of feedback.

After all, this section has explained how the experiment was prepared with an electronic survey in order to get the data and test the hypotheses. Next section will go far ahead, and will analyze quantitatively the outcomes of the experiment, and the results will be discussed.

\(^{18}\)We had been able to make the text-message linked with the previous purchased by programming in with HTML coding and using some advance features of Qualtrics. We had given each option a numerical value and we programmed the text-message to take into account the path taken by the participants in each previous scenario, in order to provide with the accurate accumulated balance account.
IV. RESULTS

In this section, the data has been analyzed carrying out several tests using statistical software\textsuperscript{19}: three descriptive tests and two analytical ones. A Bonferroni test has been run in order to analyze the outcome more thoroughly as well as three regressions that differ by the variables taken into account.

The empirical evidence for the study come from the data collected in the experiment. It has been taken the total amount spent of each individual and it has been defined as the dependent variable. The independent variable has been manipulated differently creating three groups: group one -not receiving feedback-, group two -receiving feedback in a SMS form-, group three -receiving a SMS with more detailed information.

To get a first glance of the data and to check for outliers that will distort and lead to unreliable conclusions, a box plot controlling for gender and group has been computed in order to see the basic statistics: the quartiles, the standard deviation and the median. Some outliers had been found mostly in group 3; these outliers deviate the mean and the standard deviation upwards causing a bias on the average spending of the group. As these extreme values were a small fraction of the total sample (10/386 individuals), they have been omitted to avoid not statistically significant results\textsuperscript{20}.

\textsuperscript{19} STATA “is a complete, integrated statistical software package that provides everything you need for data analysis, data management, and graphics” - <www.stata.com>

\textsuperscript{20} Recall that the study is testing that the means of group3 < group2 < group1. Pushing up the mean of group 3 can represent accepting the null hypothesis.
Figure 4: Box Plot. Total Spending (€) separated by groups [1, 2, 3] and gender [1=male, 2=female]. Left image, with outliers. Right image, outliers omitted.

From the box plots, it can be seen that the gender differences on Total Spending differ between and within groups. Concretely, the gender has a stronger effect on group 3 than in any other group.

Another way to test if there is divergence between groups expenditure is to plot an overlapped frequency histogram. By doing so, the distribution of the data and the evidence of between-group differences can be checked because the similarities or dissimilarities in the frequency distributions can provide evidence of the differences in variables. Even though this graphical analysis cannot be conclusive, it is a powerful confirmation in the direction of the hypothesis.

Figure 5.1 (left): Total Spending (in euros) frequency histogram comparison of groups 1 and 2.
Figure 5.2 (right): Total Spending (in euros) frequency histogram comparison of groups 1 and 3.
In Figure 5, it can be appreciated that there is a difference between both frequency distributions. Although both histograms share a lot of similarities, a formal test is needed. In graph 2, the differences on total spending are significantly larger as there is a considerable concentration of values in low levels of spending.

As the study focuses on the differences on Total Spending such that the means of group 3 < group 2 < group 1, the following graph shows the difference in means between and within groups.

![Graph showing mean of Total Spending by group and gender](image)

**Figure 6.1** (left): Mean of the Total Spending (€) by group [1, 2, 3]

**Figure 6.2** (right): Mean of the Total Spending (€) separated by group [1, 2, 3] and gender [1=male, 2=female]

As it can be seen in the box plot analysis, gender has a stronger effect in the payment behavior. Even though the effect of this variable was not considered as relevant in the hypothesis, in order to make further statements about the results acquired a formal test will be run. To confirm the hypothesis of differences between groups, an ANOVA\(^{21}\) test has been carried out\(^{22}\).

---

\(^{21}\) Analysis of variance (ANOVA) is a collection of statistical models used to analyze the differences between group means and their associated procedures (such as "variation" among and between groups). Cox, (2006).

\(^{22}\) We also run an F-test to test if the variance of the groups were equal.
An ANOVA with Total Spending as the dependent variable and the Feedback Manipulation as independent variables showed significant differences (p<.50) at least in one of the groups.

Because there are statistical differences in the groups’ means, a Bonferroni\(^{23}\) test has to be run in order to specify where these differences come from.

What the Bonferroni test do is to run tests to see if two group means differ one to another, from all the dimensions of the discrete variable “group”, in that sense, it is comparing each group mean with the other groups means individually. More specifically, it provides the difference in means for each group with the respective p-values associated to that difference. From this test, it is observed that group 2 spend less than group 1, but means are not statistically different (DiffM\(_{group1&2} = -7.96, p > .05\)), it

\(^{23}\) The Bonferroni test attempts to prevent data from incorrectly appearing to be statistically significant by lowering the alpha value.
is noticed as well, that group 3 spend significantly less that group 1 (DiffM\textsubscript{group1&3} = -22.75, p < .01), and this same effect appears between group 3 and 2, both means differ significantly from each other (DiffM\textsubscript{group3&2} = -14.80, p < .05).

Finally, it has been conducted three regressions differing with the variables used to verify the influence of the gender.

![Figure 9](image)

**Figure 9:** Regressions ruled by STATA. First regression takes into account the variable Groups. Regression 2 considers Groups and the interactions of gender and group two and three. The third regression considers only the statistically relevant variables of regression two.

The first regression only introduces the gender (male or female) and the group (1, 2 or 3) as independent variables. The second introduces interactions\(^{24}\) between gender and group in order to see if there is a difference within groups caused by sex. In the third regression, the independent variables that were not statistically significant had been omitted. It seems that receiving information in a SMS-form about a purchase does affect equally men and women, but if the information stated on the text message is more detailed, then, the effect differs with gender: women have a lower spending than men of the same group\(^{25}\).

\(^{24}\)An interaction occurs when an independent variable has a different effect on the outcome depending on the values of another independent variable.

\(^{25}\)The value of the coefficients is not interpretable but actually its sign is.
In this section the data has been analyzed using graphical and more formal tests to check for the relation between variables. It has been found that there are statistical significant differences among groups one, two and three and that the gender has a surprisingly strong effect on this. In the next section, the results found will be discussed using theoretical framework.

To end up with the analysis, it is proposed a plot which compares the average spending of all individuals and the estimation they made about the expenditure in the latest part of the experiment. This approach is useful because in the fundamental hypothesis of this paper it is implicitly considered that people who receive more feedback will have a better control of what they have spend.

![Comparison between the Spending and the Expected Spending](image)

**Figure 10:** Comparison between the average expected spending and the actual average spending.

In the figure 10 the results corroborate, at least at the graphical level, what was implicit in the hypothesis, the group 3 who received more information where the ones that provided better estimates of their spending, then group 2 who received fewer amount of
information performed worst in their estimates of spending compared to group one, but the group who obtained the longer distance between the spending estimates and the actual expenditure was group 1.

V. GENERAL DISCUSSION AND CONCLUSIONS

In this section, the results obtained will be discussed and related with the theoretical framework along with the conclusions. Further research will be also suggested in order to provide a fresh perspective of knowledge.

Discussion and further research

Support for the proposed theoretical framework was provided in an experiment. Research reported in this paper had shown that the feedback received after a purchase influences spending behavior. More precisely, text message influence the recall of past expenses and this have an impact on moderating the overspending effect provoked by the use of non-cash payment methods such as credit cards. Moreover, the information between the independent variable -feedback in a SMS-form- and the dependent variable -total monetary amount spent- becomes stronger as the information displayed on the text message gets more detailed. In other words, receiving feedback about the amount of money spent creates arousal on spending by the loss aversion effect and therefore, decreases the willingness to spend more money. When the information stated in the SMS provides the consumer only with the amount purchased, the level of arousal is lower than when the balance account is stated too. Seeing a decrease in wealth provokes an immediate negative reaction because the buyer can actually feel the trade-off between getting the good and do paying for the good.
Another interesting result, which was not contemplated in the hypotheses, was observed while analyzing the data. There are differences also in gender. That is, in the regression being a male was positively related to the monetary amount spent, with a statistical significance. It was checked if this difference was equally present in all groups, but statistics show that this gender difference was only relevant in group 3, concluding that “high information” manipulation had a different effect across gender.

However, gender by itself may not be a valid explanation, so previous research on gender differences and psychology was reviewed in order to explain this unexpected result. There is a plausible explanation in the risk aversion literature. Some authors assert that women are more risk averse than men, and since in our experiment, respondent did not know in advance how many products they were going purchase, this uncertainty had pushed down women spending more than men spending.

To test for this new hypothesis, a new experiment has to be proposed where the number of products the respondents will face is clearly stated. With this fresh viewpoint, the results are expected to diverge less between genders; women will not spend less by the mere fact that they do not know the number of products.

**Conclusions**

Consumer may not always follow a rational utility maximization evaluation for purchases and may rely more on the past expenses recall. First, the current research proposed in this study is the first one to incorporate the text message and the

---

26 Introducing interactions between gender and group in the regression, by multiplying both variables, (gender*group).
information stated in these SMS as a factor that not only shapes purchasing behavior but also may have broader implications for decision making. Second, the goal of the paper is to explain the differences that arouse because of payment methods by validating a behavioral framework based on evolutionary psychology.

Growing credit card household debt and the rise of bankruptcies and failures have highlighted the need for research to address consumption patterns when paying with credit in order to allow consumer to better manage their own finances. While the paper offers some implications for future public policy, future research should be addressed.
VI. REFERENCES


*Online survey*
Link to the survey proposed: https://pompeufabraee.eu.qualtrics.com/SE/?SID=SV_9KsustNfXRH2evX
ANNEX. ELECTRONIC SURVEY

The present annex is the script that has been used to program the survey electronically. It has been decided to add it to provide extra information for the reader.

FIRST PART: BASIC INFORMATION

[1] What is your gender?

Female  Male

What year were you born?

In which country do you reside?

SECOND PART: KNOWLEDGE TEST

[2] You are planning to go on holidays this summer. You had accepted a job in order to have money to spend in your holidays.

You got a job in a company called “Maps and Flags SA”. “Maps and Flags SA” was created in 2005 in order to make geography maps for school books.

Your boss wants to know which position you can perform best. That is why before getting the position; he makes you do a test to assess your knowledge in geography. Depending in your performance on the test, you will get offered different positions on the company. (Higher positions means higher salary)

[3] Which is the capital of Australia?

Sydney  Melbourne  Canberra  Perth
Which is the flag of Thailand?

_Different flag-options were shown._

Which is the capital of Ethiopia?

Libreville  Gerardtown  Gabon  Adis-Abeba

Which is the country colored in yellow?

Austria  Czech Republic  Ukraine  Sweden


Welcome to the office! Your new job is:

_“Map cartographer junior”_

The net wage for this position is **800€/month.**

---

THIRD PART: SPENDING STORY

[5] After working there for a few months… Summer has arrived, and you have been able to save **475€** in your account, in JGM Bank. You and your friends had decided to go to Menorca. You are going to stay in a rented house near Ciutadella (the main city) for a **week.**

Menorca is a really beautiful island that recently had become the first **FREE CASH Island.** That means that none in the island accepts cash. Menorca **ONLY** accepts credit card. _So, you are ONLY able to pay with your credit card. This means that you are able to spend more money that the one you have saved_
You are about to go to Menorca, and you need to find an apartment quickly to rent because summer is getting closer and the nicest apartments are been rented. Each of your friends (5 people counting you) are going to pay its proportional part. You are going to pay by credit card - As we said earlier, Menorca does not accept any type of cash. You need to take three things into account when renting an apartment: the number of beds, the distance to the beach and the price.

<table>
<thead>
<tr>
<th>Price/Person</th>
<th>Beds</th>
<th>Distance to Beach</th>
<th>Price</th>
<th>Distance to Beach</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.220€/5</td>
<td>5 beds</td>
<td>200 meters</td>
<td>244€</td>
<td>800 meters</td>
</tr>
<tr>
<td>840€/5</td>
<td>5 beds</td>
<td>800 meters</td>
<td>168€</td>
<td></td>
</tr>
<tr>
<td>900€/5</td>
<td>4 beds</td>
<td>450 meters</td>
<td>180€</td>
<td></td>
</tr>
<tr>
<td>650€/5</td>
<td>4 beds</td>
<td>1000 meters</td>
<td>130€</td>
<td></td>
</tr>
</tbody>
</table>

(Note of the authors, not displayed on the survey: After every purchase, participants who are randomly assigned into group 2 receive a message such as figure 1 and participants assigned to group 3 a text message like figure)

You are finally in Menorca. Its the 3th of August and you are going to be there a week. The first day there, you stop by the only pharmacy in order to buy sunscreen, because you had forgotten yours, and you are aware of the dangers of the sun.
“We have four types of sunscreen.” – said the pharmacist. “Which one do you want to buy?”

<table>
<thead>
<tr>
<th>14,50€</th>
<th>15,40€</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avène 50+</td>
<td>ISDIN 50+</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>13,95€</th>
<th>16,36€</th>
</tr>
</thead>
<tbody>
<tr>
<td>La Roche-Posay 30+</td>
<td>Bioderma 50+</td>
</tr>
</tbody>
</table>

[9] After and amazing day on the beach, you realized that all your friends are wearing sunglasses, and you are the only one who is not. Your eyes are hurting, so you decide to buy a pair. You stop by the only optical shop in Menorca. “Good morning, how are you? We are currently selling only these four brands of glasses.”

<table>
<thead>
<tr>
<th>41€</th>
<th>68€</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polaroid</td>
<td>Carrera</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>119€</th>
<th>87€</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ray Ban</td>
<td>Oakley</td>
</tr>
</tbody>
</table>

[10] You watched a soccer match. Your team had won, so you are really happy, and you decided to invite your friends to dinner. You are not a great chef, so you decided to buy 5 pizzas for everyone. The only supermarket in town, has four types of pizza. People from Menorca love pizza.

<table>
<thead>
<tr>
<th>2.70€ * 5 pizzas = 13,50€</th>
<th>2.75€ * 5 pizzas = 13,75€</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casa Tarradellas</td>
<td>Buitoni</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.95€ * 5 pizzas = 14,75€</th>
<th>1.89€ * 5 pizzas = 9,45€</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Oetker</td>
<td>White-label product</td>
</tr>
</tbody>
</table>
The next day, your friends and you decided to go hiking to the tallest mountain because there is an amazing view of the whole island. The hiking to the top of the mountain will be around 8 hours aprox. You are going to sleep at the top of the mountain in order to see the sunrise the next morning. Each of you are going to carry a bottle of **water**, a **lighter**, a **sleeping bag**, some **food**, **toothbrush** and some **other stuff** needed for the trip. *You didn’t let your mum help you with the packing, so you realized you didn’t pack a bag.* Near the starting point of the trip, there is a small town with a small shop. They do **not** have plenty of different types of bags.

<table>
<thead>
<tr>
<th>€50.45</th>
<th>Timberland, 22 litres</th>
<th>€92</th>
<th>North Face, 25 litres</th>
</tr>
</thead>
<tbody>
<tr>
<td>€33.34</td>
<td>Columbia, 24 litres</td>
<td>€70</td>
<td>Eastpack, 24 litres</td>
</tr>
</tbody>
</table>

After watching an amazing sunrise, and been walking for 8 hours to return to the city, you are starving. *Everyone agreed on going to McDonalds.*

<table>
<thead>
<tr>
<th>€8.70</th>
<th>2x Cheeseburgers Small fries 6 Chicken McNuggets Small Drink</th>
<th>€4.30</th>
<th>Cheeseburger Small Fries Small Drink</th>
</tr>
</thead>
<tbody>
<tr>
<td>€7.40</td>
<td>Cheeseburger Small Fries 6 Chicken McNuggets Small Drinks</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

After McDonalds, you went to have a few spirits in the beach, and you ended up forgetting your flip flops there. As soon as you realize about it, you return barefoot to
the beach, but sadly your flip flops weren’t there. *Furthermore, Menorca is a tiny island and there is a shop that sells flip-flops. The only shop that sells them*

\[
\begin{array}{|c|c|}
\hline
28\text{€} & 17.90\text{€} \\
\text{Havaianas} & \text{Kappa} \\
\hline
3.90\text{€} & 10.99\text{€} \\
\text{White-label product} & \text{Petrol Industries} \\
\hline
\end{array}
\]

[14] The fourth day, your friends and you need to rent a car for three days to move through the entire island. Each of your friends are going to pay its proportional part. You are going to pay by credit card, as we say earlier; Menorca does not accept any type of cash. You have to rent a car for **5 people** for **3 days**. **You are going to be the driver**, as any of your friends has the license.

\[
\begin{array}{|c|c|}
\hline
197\text{€}/5\text{people}= 39,40\text{€} & 252\text{€}/5\text{people}= 50,45\text{€} \\
\text{Seat Leon} & \text{Opel Corsa} \\
\text{Manual} & \text{Manual} \\
24 \text{km/l} & 29 \text{km/l} \\
\hline
340\text{€}/5\text{people}= 68\text{€} & 309\text{€}/5\text{people}= 61,80\text{€} \\
\text{Hyundai i30} & \text{Volkswagen Polo} \\
\text{Automatic} & \text{Manual} \\
19 \text{km/l} & 16,90 \text{km/l} \\
\hline
\end{array}
\]

[15] After renting the car (Congratulations), you decide to go to the Northern Beach. This beach is far away from where you are. There are no towns nor villages near that beach. And you need to buy a beach towel because you did not packed any and you
have been using your shower towel to go to the beach and to take showers, and your friends are **getting mad** at your body smell.

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
<th>Brand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emporio Armani</td>
<td>34€</td>
<td>Emporio Armani</td>
</tr>
<tr>
<td>Quechua</td>
<td>12€</td>
<td>Quechua</td>
</tr>
<tr>
<td>White-label product</td>
<td>8€</td>
<td>White-label product</td>
</tr>
<tr>
<td>Textura</td>
<td>20€</td>
<td>Textura</td>
</tr>
</tbody>
</table>

[16] After the trip to Menorca, a friend who is planning to do a similar trip asks you how much money you had spent. *So, how much money do you think you had spent? (write down a number, you should try to be as accurate as possible)*