

CHARLES UNIVERSITY IN PRAGUE

FACULTY OF SOCIAL SCIENCES

Institute of Economic Studies

Václav Toman

Voluntary Restrictions and Self-commitment

Bachelor Thesis

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Author: **Václav Toman**

Supervisor: **PhDr. Michal Bauer, Ph.D.**

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Abstrakt

V naší práci shrnujeme literaturu zabývající se tématem duálního já a navrhuje různé druhy omezení, která může dlouhodobé já uvalit vůči myopickému já týkající se prokrastinace, zdraví a emocí.

Motivováni touto literaturou dále pořádáme dotazníkový průzkum zaměřený na zkoumání dvou hlavních výzkumných otázek:

Do jaké míry jsou lidé ochotní dobrovolně omezovat sami sebe?

Jak osobní charakteristiky jako kognitivní schopnosti, vzdělání, svědomitost či pohlaví ovlivňují takové chování?

S využitím ekonometrických metod na našich vlastních datech docházíme k závěru, že fenomén dobrovolného omezování sebe sama je přítomen v naší soudobé společnosti do značné míry.

V souladu s předcházejícími studii mají ženy tendenci se omezovat výrazně více než muži, zatímco vyšší bodové ohodnocení v Testu Kognitivní Reakce (CRT), vyšší vzdělání a nižší svědomitost vedou k nižšímu zájmu o auto-regulační opatření.

Abstract

In our work, we summarize the literature describing the topic of dual self and propose various types of restrictions the long-run self might impose on the myopic self concerning procrastination, health and emotions.

Motivated by this literature, we conduct a questionnaire survey to explore two main research questions:

To what extent are people willing to impose restrictions on themselves?

How do individual characteristics such as cognitive abilities, education, conscientiousness or gender determine such behavior?

Using the econometric methods on our originally collected data we find that the phenomenon of voluntary restriction of self is present in our contemporary society to a large extent.

Consistent with previous findings, women have a tendency to restrict themselves significantly more than men, while higher Cognitive Response Test (CRT) score, higher education and lower conscientiousness cause lower interest in the self-commitment facilities.

Klíčová slova

Duální já, sebeomezování, test kognitivní reakce, svědomitost, behaviorální ekonomie, dotazník

Keywords

Dual self, self-regulation, Cognitive Response Test, conscientiousness, behavioral economics, questionnaire

Rozsah práce: 71 tisíc znaků

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Prague, May 16, 2012

Václav Toman

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UNIVERSITAS CAROLINA PRAGENSIS
založena 1348

Univerzita Karlova v Praze
Fakulta sociálních věd
Institut ekonomických studií



Opletalova 26
110 00 Praha 1
TEL: 222 112 330,305
TEL/FAX:
E-mail:
ies@mbox.fsv.cuni.cz
<http://ies.fsv.cuni.cz>

Akademický rok 2010/2011

TEZE BAKALÁŘSKÉ PRÁCE

Student:	Václav Toman
Obor:	Ekonomie
Konzultant:	PhDr. Michal Bauer, Ph.D.

Garant studijního programu Vám dle zákona č. 111/1998 Sb. o vysokých školách a Studijního a zkušebního řádu UK v Praze určuje následující bakalářskou práci

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Charakteristika tématu, současný stav poznání, případné zvláštní metody zpracování tématu:

Struktura BP:

Práce se bude skládat ze dvou základních částí.

Cílem první části práce je představit současné teorie, kterými behaviorální ekonomie popisuje dobrovolná omezení a závazky. Na základě ekonomické a psychologické literatury pak bude zkoumána efektivita takových omezení, dopad na užitek jednotlivce, a společenský a psychologický kontext.

Cílem druhé části práce je zkoumat přítomnost a konzistenci (resp. variabilitu) těchto jevů ve společnosti. K tomu budou využita data sebraná od vhodného dostupného vzorku pomocí dotazníků.

Závěrem práce bude srovnání dvou zmíněných částí, a tedy ověření platnosti daných teorií v místním prostředí.

Osnova

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Vysvětlení teorie a modelu

2. Možná využití modelu a existující literatura

Dobrovolné omezení ve věcech prokrastinace

Dobrovolné omezení ve věcech zdraví a nadměrné spotřeby

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Introduction

People do not often act as the standard economic theories propose. As the various papers on behavioral economics have shown, there are many important flaws to be dealt with. O'Donoghue and Rabin (2003) suggest that the notion of rationality and the notion of sophistication in terms of complete awareness of our present and future utility has to be eased or better yet adjusted to be applicable to actions of various economic agents. The field of behavioral economics has introduced various explanations and models describing such behavior, e.g. David Laibson's quasi-hyperbolic discounting model.

In this thesis, we will build on the model of the Dual Self by Fudenberg and Levine (2006). The focus is to show, that economic agents often voluntarily build the obstacles to their own actions. This seems irrational from the classical economics point of view. However if we view this problem as a game of the forward-looking self and the myopic self, as Fudenberg and Levine have suggested, we can see that these obstacles become quite well-justified and rational.

Thaler and Shefrin (1981) offer a similar model. In their case, the individual is viewed as a company, and the forward-looking self is described as the owner of the company, and the myopic self is the manager.

The main point is that people do have self-control problems. They tend to overestimate their future abilities and present utilities over the present abilities and future utilities. Some of these people are however aware of their self-control problems and they (or their long-run self) create barriers against their future misbehavior and future mistakes (or their future myopic self). They put their alarm clock out of reach from their bed, so that they cannot simply press the button to continue sleeping. They take only small amount of money when visiting the grocery store or the pub, so that they cannot spend too much due to succumbing to sudden temptation. And as Dellavigna and Malmendier (2004) report, they buy a season ticket to the gym so that they face the direct trade-off between losing their money and not exercising.

Shane (2005) suggests that there is a correlation between person's cognitive ability (or their IQ) and their ability to stay patient and not to act impulsively. In his paper, Shane introduced the Cognitive Reflection Test (CRT), which is designed to "*measure "cognitive reflection" — the ability or disposition to resist reporting the response that first comes to mind*". He had found out that people with higher CRT score

(i.e. closer to 3 points on a 0 to 3 points scale) are more “patient” than those with low scores. Their decisions concerning other questions imply lower discount rates. We will use the Czech translation of his test to test whether people with higher CRT scores tend to restrict themselves more or less.

In the first part of the thesis, we will summarize the existing work on the topic, and then we will explain the theoretical aspects of the self-control problem and view different past and current topics through the scope of voluntary restrictions.

In the second part, we will present the results of my empirical findings about the presence of this phenomenon amongst the Czech population. The data were collected using a questionnaire consisting of 30 questions, distributed through the internet.

There are two main research questions we are asking: 1) To what extent are people willing to impose restrictions¹ on themselves? And 2) How do individual characteristics such as cognitive abilities, education, conscientiousness or gender determine such behavior?

My zero assumptions were that people with higher CRT scores and higher education tend to restrict themselves more, that they are more patient in their consumption, and that people tend to create barriers for themselves in areas that are of higher importance to them.

¹ In the literature, the term self-commitment might be considered more appropriate. We sometimes interchange these two terms and use “restriction” when we want to emphasize the (temporary) loss connected with such behavior.

1. Theory of self-commitment

1.1 Model-based theory

Economic agents often act in a way that is not time-consistent. They value various payoffs (emotional, financial, etc.) differently at one point in time than at some other point in time. As various experiments have shown (Some of them are reviewed in Shane, Loewenstein, O'Donoghue, 2002.), people have a different perspective about time lags in the near and in the far future. Waiting for a day or week today seems painful, but waiting for a day in a year seems like nothing to them. It seems people view the time lags on a relative scale, always comparing the gap that follows the lag and the lag itself.

People who suffer from self-control problems tend to damage themselves both socially and economically. O'Donoghue and Rabin (2001, 2003) divide these into two groups. The naïves, who tend to underestimate their problems and misinterpret their future utility from their present and future actions, and the sophisticates. In between lay the partial naïves. (“A person is aware that she will have future self-control problems, but underestimates their magnitude.”) O'Donoghue and Rabin argue that theory based on at least a small amount of naïvete is robust to a theory concerning only sophisticates. In their discussions, they use a simple model for intertemporal preferences at time t , U^t based on Phelps and Pollak (1968), later used by Laibson (1997):

$$U^t(u_t, u_{t+1}, \dots, u_T) = u_t + \beta \sum_{\tau=t+1}^T \delta^{\tau-t} u_{\tau} \quad (1.1)$$

Where u_t is the instantaneous utility a person receives in period t ; δ is the standard discount factor representing the time-consistent view of the future gains; and β is a time-inconsistent preference for immediate gain. $\beta < 1$ means a bias towards the present. They have also introduced $\hat{\beta}$ - the perceived β , and $\beta - \hat{\beta}$ as the main reason why people may maximize the preferences that are, in fact, not their real preferences. This is the answer to the question: “Why do people view different outcomes differently in various times, and why do they misjudge their own future preferences?”

The Dual Self model of Fudenberg and Levine (2006) comes as a reaction to these theories. It tries to answer the question about how does a person who is aware of her future misjudgment (i.e. myopia) react to this knowledge. Their reasoning falls more to the domain of the game theory. To put it in their words: *“The stage game is played in two phases. In the first phase, the long-run self chooses a self-control action that influences the utility function of the myopic self. That is, at some reduction in utility (for both selves) the long-run self can choose preferences other than the baseline preferences. In the second phase of the stage game, after the short-run player preferences have been chosen, the short-run player takes the final decision.”*

The strategy of pre-commitment was first described by economist Robert Henry Strotz (1956), who argued that it is highly rational and that it was evidently present in contemporary society. In this thesis, we expect to find the evidence that it is to be seen even densely in the present society. We suspect that people want to ask their friends or institutions to force them to work or to prohibit them from smoking, drinking, or procrastinating; and that they try to put their own money out of their reach.

Baumeister, Vohs, Tice (2007) suggest that self-control does not only require certain power, but also certain energy. People who invest their energy into self-control can reach the state of *“ego depletion”*, where their ability to control themselves dramatically decreases. In other words using person’s energy to control themselves at a dinner and not ordering a dessert while everyone else at the table is having one, can cause the same person to consume more alcohol that night.

The self-regulating decisions are costly and that is why people tend to organize their lives around stable patterns that minimize the amount of deliberate decisions and why people sometimes view a disruption of these patterns so drastically. Gailliot et al. (2007) experimentally discovered that the state of ego depletion can be reversed by drinking a glass of sugary lemonade (consuming glucose). Glucose evidently functions as a fuel for self-control or for the *“long-run self”*. Baumeister also discusses, that temporal reversal of ego depletion can be achieved by motivational and framing factors.

Such view also suggests that like every activity that requires strength or energy, self-control can be trained. People, who are required to inhibit their own actions and desires on a regular basis, might prove to be better in other various tasks that require self-control than the average people. This observation points towards an idea that people with higher level of education should think more in long-term, because they were (or are) required to face procrastination on a daily basis, both at school and at work.

1.2 Procrastination and restrictions in savings

Procrastination is a typical failure of self-control. People simply overestimate their future abilities and their future willingness to spend more time with their work. The fact that Czech people are more and more aware of this problem can be shown by the fact, that the word “prokrastinace” (the Czech translation of “procrastination”) experienced significant boom in year 2011 in the Czech Republic, whereas “procrastination” experiences slowly increase each year worldwide. (Google, 2012)

1.2.1 Determinants of procrastination

Benartzi and Thaler (2004) suggest that procrastination is a matter of how immediate, how complex and how important the task is. The more important the task, the more likely the person is to procrastinate. We do not really care that much about buying new socks, reading a novel someone has recommended to us, or writing an e-mail to catch up with our friends. And people do not generally suffer of procrastination in these tasks, provided of course, that they do care at least a little. Nevertheless there is no need of discussing procrastination in terms of things that you do not need or want to do. On the other hand when it comes to important tasks like writing a thesis, getting a driver’s license, going to the doctor with that strange lump you have found on your back, or professing our feelings to a beloved person, we tend to push those tasks as far away from here and now as we can.

O’Donoghue and Rabin (2001) reported that providing a person with additional options can induce procrastination (by increasing the complexity of the task). A person might benefit from the fact that only one choice of retirement savings is present, because if he/she has no choice, they cannot make a mistake, and there is nothing to think about; whereas if he/she had various saving plans to choose from, they might start “overthinking” the problem, postponing the decision to the latest possible moment because of overwhelming fear of making the wrong decision now.

They also suggest another reason for procrastination which can be summarized as “too much free time”. The person who has a lot of free time now views the cost of her future time lower than a person that is busy. Mere postponing of the task seems less painful than having to deal with it now. Therefore the people who are preoccupied with

lots and lots of various small tasks are more likely to be effective in their important tasks.

Lastly delaying an important task can be encouraged by completing a different smaller task that can solve the problem now but has very low effectiveness in the future. The producers of duct tape have been profiting from this phenomena for decades now. Why change your leaking pipes when you can just use a duct tape? Why put your money in a savings account when you can just keep it on your current account and promise yourself you will not use it? Bernatzi and Thaler (2001) point out that people tend to distribute their savings evenly in what is called “the $\frac{1}{n}$ strategy” or “the $\frac{1}{n}$ heuristic”. They distribute their savings in equal amounts in all the possible savings plans. This could be viewed as a sign of postponing the real decision about savings to later, while still attaining the feeling that they have already faced the issue. Although this is clearly more profitable than simply ignoring the problem, the loss of future possible profits and the failure of short-sighted duct tape repairs pose an important problem.

1.2.2 Examples of commitments against procrastination

People can and, as we will see later in this work, do restrict themselves in order to fight the addressed problems. College students can restrict themselves from procrastination by attending an unnecessary lecture or seminar (meaning the lecturer merely repeats the material provided in textbook, and there is no formal rule forcing them to do so), simply because they fear they would not otherwise spend their time studying and that they would succumb to browsing the internet, reading a novel, or practicing with their musical instrument.

People can deter themselves from procrastination in saving simply by letting a trusted person or institution to hold on to certain sum of their money each month or year. (Even without a profiting from the transaction in term of interest payments.) In the Czech Republic, various saving accounts with long waiting period before each or first withdrawal can be used, e.g. building savings, where there are no withdrawals allowed for the first 6 years of saving.

In a similar way, people make unnecessary promises to friends, academics agree to give a paper at a conference or musicians give public statements about their future

albums. By these promises they generate an additional incentive to work on these projects, because if they do not, their failure is going to be even bigger.

Madrian and Shea (2000) proposed that people can pre-commit themselves by agreeing to commit in the future, i.e. participating in policies that adapt automatic enrollment. Social and economic policies that do so were found not only to be useful, but also to be demanded. Bernatzi and Thaler (2004) later built on these findings and designed a plan to increase workers savings proportionally with the increase of their salaries. Workers were approached early before their salary increase and offered automatic enrollment with the option to opt-out any time they wanted. Their savings plan achieved enrollment and participation rate of about 80%, and increased workers average savings rate from 3.5% to 13.6% which is successful to say the least. The SMarT program (Save More Tomorrow) however paternalistic seems to give the long-run self exactly what it wants.

Ariely and Wertenbroch (2002) discovered that many MIT students wanted to pre-commit to more restrictive paper deadlines rather than to have the option to make all the papers due by the end of the semester.

Another way we can pre-commit ourselves is to restrict the amount of our future possibilities. For example a student can choose a narrow topic of essay early; or a person who could just as easily stay self-employed can get employed so that it simply receives its daily amount of work without having to choose which job to take.

1.3 Health and restrictions against addiction and excessive consumption

Thanks to the modern age medicine, people live longer than before. Moreover, people are more informed and aware of what is good and bad for their current and future health. Where in the prehistoric ages people would only occupy themselves with escaping predators and searching for food, the people of the modern era have to think about whether they are eating too much, or whether they are eating healthy. Availability of alcohol, coffee, cigarettes, and both legal and illegal drugs comes with new self-control challenges, self-control failures and ways that people can use to restrict their future myopic self.

The World Health Organization (2008) reported that the leading 10 causes of death in high-income countries are ischaemic heart disease, cerebrovascular disease,

cancers of trachea, bronchus and lungs, Alzheimer and other dementias, lower respiratory infections, chronic obstructive pulmonary disease, colon and rectum cancers, diabetes mellitus, hypertensive heart disease and breast cancer. 8 of these are believed to be correlated with (or even caused by) bad diet and / or smoking. Both professionals and media consider obesity and smoking a major issue, and so even the average people hear about them every day. The awareness of the issue increases the demand on commitment against impulsive consumption.

The risks of self-control problems and impulsive behavior are quite evident. Smoking the first cigarette could have dire consequences both to person's health and to person's wallet; consequences that are very hard to evaluate by an average person (sophistication seems nearly impossible). This average person might protect itself by imposing a simple rule never to try smoking to avoid the risk of temptation. People who have already started smoking and are trying to quit might stop visiting bars and pubs, or even their smoking friends to avoid the smelly temptation.

As Madden, Petry, Badger, and Bickel (1997) discovered, the physical dependence can dramatically alter person's discount rate. They found out that opioid-dependent patients are in fact very impulsive. They valued the immediate dose of heroin significantly above the delayed dose. (i.e. Their discount rate was found to be significantly higher than that of the control group.) The fact that heroin addicts value their immediate dose above anything else is no surprise; however even a partially naïve person might underestimate the changes that addiction can do to her future perception of her utility. A sophisticated person or semi-sophisticated person on the other hand might impose a simple rule never to risk such a change in behavior.

Dietary restrictions are indeed very common in the today's society. People avoid fatty, salty, or sugary food. They take pills to change appetite, lock up their sweets. They even avoid the fast-food restaurants or the certain parts of the supermarket, where these unhealthy groceries are sold. Some of the supermarkets try to anticipate such behavior by mixing healthy and unhealthy food in one aisle. More and more people nowadays also undergo gastric bypass surgery so that they cannot eat as much as they would currently want to. Alcoholics also can take the drug Disulfiram (or Antabuse), that literally makes them sick when later mixed with alcohol.

Baumeister (2007) discusses that: "Alcohol intoxication makes people stop monitoring their behavior. ... Drunken people stop keeping track of their spending, the wisdom of their comments, their eating, their smoking, and even their drinking itself."

Alcohol is obviously a temporary long-term self killer, and therefore controlling one's drinking is as important as controlling everything else in our lives.

The much less drastic way of exercising dietary self-control is simply agreeing to monitor the number of calories (amount of alcohol, number of cigarettes ...) we give to our body. Polivy et al. (1986) shows that people, who are forced to monitor their food intake (or who are being publicly monitored), tend to consume less. Public attention seems to have even better effect than self-monitoring. People with overconsumption problem might therefore pre-commit themselves by only eating in public. Moreover a dieter who is forced to violate his diet tends to consume more, because he views his diet as "lost for the day". This suggests that dieters might profit from mentally dividing the day into smaller parts and monitor their consumption in each of these parts.

Another way to stay healthy is to exercise. Fitness centers and gymnasiums are very popular in modern towns and cities. Almost every sporting facility also meets the need to pre-commit by offering season tickets or memberships. The money paid for buying a season ticket represents a sunk cost for a specific way to spend person's time. As Arkes and Blumer (1985) have shown in a theatre experiment, once the person has some sunk cost in the ticket, it is more likely to attend the play, although this effect diminishes over time. Semi-sophisticates should be aware of such effect, and they should try to commit themselves to more exercise by buying the season tickets.

Dellavigna and Malmendier (2004) discovered that many people pay higher amount per visit at the gym, because they buy an expensive membership, and still do not visit the gym often enough. This shows that they are trying to pre-commit themselves. If they were not membership owners, they most likely would visit the gym even less often. The price difference of the amount paid for membership divided by number of visits and the price of one non-member visit is the price of pre-commitment.

1.4 Emotional regulation

People are often victims of their own emotions. The Merriam-Webster online dictionary (2012) describes emotion as: "a conscious mental reaction (as anger or fear) subjectively experienced as strong feeling usually directed toward a specific object and typically accompanied by physiological and behavioral changes in the body". Emotions can make us do and say things that we later regret (sometimes in matter of seconds).

Two emotions are the most dangerous: fear and affection. When an emotion catches us unprepared, we forget to watch our step because of recently discovered fondness of a nice girl or boy; we choose to drive the wrong way because we are too afraid to ask for directions, or too afraid to be seen asking for directions; or worse we can end up signing an unfavorable contract.

Emotions however can be used as a matter of self-regulation. Ainslie (1986) suggests that a person might impose private rules to emotionally punish herself for misbehaving. *“For instance, an overeater can adopt a diet which each act of eating must either violate or not; thereafter any act of overeating will lead not only to a small gain in weight but to a major fall in the person’s expectation that he would stick to his diet in the future.”* In other words people can put their decisions into clusters, and with every bad decision punish themselves with bad emotions and thinking less of themselves. This self-constraint however, when taken too far, can lead to various psychological diseases, e.g. bulimia or anorexia. We leave the discussion of these problems to medical professionals.

The opposite way of pre-commitment would be connecting painful and hard tasks with pleasant rewards that we award to ourselves. The whole phenomenon of celebrating various achievements could be viewed as such an occasion. For example, a successful business that will generate a steady income over a large period of time should be viewed as a reward in and of itself. However people still plan to engage into mindless celebrations once the task is complete. This could be viewed as connecting the hard work with immediate gratification, towards which almost everyone has a certain bias. (O’Donoghue, Rabin, 2000)

There is also another way to describe such a behavior. In the game of present-biased and the long-term biased self, the long-term biased one wants to establish a certain amount of trust that it is willing to offer something to the other one in order to receive some reward in the future in form of suppressing sudden urges to misbehave. Berg, Dickhaut and McCabe (1995) created an experiment, where they showed, that establishing trust between two people can be used for mutual gain. These findings could be applied to the intrapersonal game of dual self. In a more comprehensive way we can say that a person, who exercises such behavior is more likely to be at peace with herself and less likely to feel the urge to misbehave or punish misbehavior strongly.

If people can predict their emotions, they act differently. For instance Akerlof (1991) suggests that in the famous experiment of Stanley Milgram of 1975, where he let

subjects to administer fake electrical shocks to an actor's body under pressure of authority, the revealed preference of the subjects need not to be preferred to the options left not chosen. From the viewpoint of the fight between myopic and long-run self, this is a typical case, where the long-run self had no time to prepare and to consider where it is willing to go and where it is not. The myopic self is left with affection for the authority and fear of failure. Akerlof also reports that the later surveys that have been made show that when not under pressure, nobody would intend to act as the subjects had acted. This suggests that if the subjects had had time to prepare (e.g. had seen somebody in the same situation), they would have behaved differently.

Certain mental institutions also allow people to commit themselves even though they are not legally obliged to. Potential aggressors or people suffering from depression do so to prevent themselves from hurting other people or themselves.

2. Sample and survey design

In this part of thesis we will discuss the questionnaires (See Appendices A and B) and the results that collecting the responses provided.

2.1 Sample

The questionnaires' main focus was to inspect the driving forces behind voluntary restrictions against procrastination, excessive consumption and consumption of vices. They were distributed only in the Czech language and collected online between 2/26/2012 and 3/7/2012. Considering the questions asked during the collecting of the responses, we believe that most of the respondents were from Prague or Central Bohemia. There were 415 returned questionnaires. 207 of the respondents were men and 205 of the respondents were women. Average age was 26.81; however both mode and median age were 22.

287 respondents were students, 81 were employees, 23 entrepreneurs, 15 retirees and 9 were unemployed. 38 people were employed in the public sector, while 70 were employed in the private sector. (The sum of these numbers exceeds the number of

employees, because some people who considered themselves to be primarily students were also employed in one of the two sectors.)

The highest attained level of education was primary for 11 people, secondary without maturity exam for 8 people, maturity exam for 291 people, higher specialized education for 3, bachelor's degree for 49, master's degree for 50 and PhD. for 3.

Field of study was Economics for 209 respondents, other Social Sciences for 61 respondents, Natural Sciences for 32 respondents, Engineering for 67 respondents and other for 34 respondents.

The income distribution in the sample is described in table 2.1.

<i>Income</i> ² :	<i>Respondents</i> :
0 to 5	177
5 to 10	82
10 to 15	46
15 to 20	21
20 to 25	36
25 to 30	26
30 to 35	8
35 to 40	4
40 to 45	2
45 to 50	2
over 50	11

As it is apparent from the information above, the data collected are far from being representative. The biggest part (about $\frac{3}{4}$) of the sample is college and university students with low income (most of them students of economics). However there is still variation in the sample. The number of students is no surprise, since it is the college students, who are most likely to answer questionnaires used for analysis in a bachelor's thesis.

2.2 Data

The first part of the questionnaire is the frequently used variables we would like to account for. The results of those were summarized in the previous section. The next three questions (8 to 10, see Appendix A) are the Cognitive Reflection Test (CRT). We

² Net income in thousands of CZK per month

have translated the CRT into the Czech language (See Appendix B). CRT was introduced by Frederick Shane (2005) and is designed to measure “cognitive reflection” – “*the ability or disposition to resist reporting the response that first comes to mind.*” In his work, he has shown that it is correlated with other widely used intelligence tests and that people who score higher in these tests tend to be “more patient.” (i.e. Their decisions imply lower discount rates.) Using this test, we expect to find a correlation between the score and the person’s desire to restrict and control herself, thereby expanding his work.

Questions 11 to 17 and questions 18, 19, 21, and 24 are taken from the paper by Ameriks, Caplin, Leahy and Tyler (2007). The first part of these questions is set to discover individual time preferences and identify problems with self-control. In analyzing answers to these questions, Ameriks et al. (2007) propose 3 identifying assumptions:

“A1: We assume that the Gul and Pasendorfer model is valid.

A2: We assume that our question is answered in terms of the model, as a question concerning the value of the key parameters of the model in the allocation problem that is presented.

A3: We assume that the self-control parameter translates perfectly from our two period hypothetical choice problem to the more general problem of wealth accumulation.”

The Gul and Pasendorfer (2001) model is another model describing the time inconsistent behavior in consumption allocation. There are only periods 1 and 2. The consumer maximizes the sum of his utility function and “*temptation function*”, $T(c_1, c_2)$. The utility associated with a particular set of feasible consumption choices, $A \subset \Gamma(W) \equiv \{(c_1, c_2) \in R_+^2 | c_1 + c_2 \leq W\}$, is:

$$V(A) = \max_{(c_1, c_2) \in A} [U(c_1, c_2) + T(c_1, c_2)] - \max_{(c_1, c_2) \in A} [T(c_1, c_2)], \quad (2.1)$$

where $U, T : R_+^2 \rightarrow R$. The goal of the designed questions is to measure the difference between the actual and the ideal proportion of wealth consumed in period 1.

The second part from Ameriks et al. (2007) is the questions taken from Costa and Widiger (1994). These try to quantify one of the Big Five personality traits - Conscientiousness.

The authors have designed a way to simply measure the persons' self-control and self-control problems. In their analysis of university students and staff, they have found a significant group of people who tend to underconsume, and that younger people have more self-control problems than the older. In the analysis, it is assumed that people are aware of their self-control problems and how those affect their choices.

The rest of the questions are statements pointed to a person's introspective conscious desires and decisions concerning problems with self-control and ways to impose various restrictions onto him/herself. The aim is to discover how much do the people desire to restrict themselves, if self-commitment is a device more widely used by people, who believe they have self-control problems or if the opposite is true. The main point however is to discover the relationships between these and the previous questions.

3. Results of the analysis

In the analysis of impact of relationship between the presented variables, we have mostly used the Ordinary Least Square regression (OLS). When we were unable to reject heteroskedasticity assumption with the Breusch-Pagan test at the 10% significance level, we used the heteroskedasticity-robust HC3 standard errors. We use the t-test when testing for statistic significance, and the F-test when testing for joint statistical significance. We refer to the variables passing the test as "statistically significant" at a certain significance level, and variables failing the test as "statistically insignificant" at a certain significance level. We chose the HC3 standard errors based on Long and Ervin (2000) and the size of the sample. All the regressions were run and summarized in statistical software Stata®.

Now we will introduce the variables included in the analysis. Variable *age* represents the person's age. Variable *male* is a binary variable that equals 1 if the respondent is male. Variables *student*, *entrepreneur*, *employed*, *unemployed*, and *retired* are binary variables that represent the person's occupation. Variables *public* and *private* represent if the person is employed in private or state sector. Even the answers of those, who did not state that they are employed, were accepted, since students have part-time (and full-time) jobs too. Binary variable *edu1* represents basic education; *edu2*

represents secondary education without the maturity exam; *edu3* represents secondary education with the maturity exam; *edu4* represents higher specialized education; *edu5* represents the Bachelor's Degree, *edu6* represents the Master's Degree; and *edu7* represents doctorate. The variables are set not to be mutually exclusive. (i.e. if $edu5 = 1$ then $edu1 = 1$ and $edu3 = 1$) Variables *economist*, *socialsc*, *natursc*, *techsc*, and *othersc* represent the person's field of studies. (Economics, Social Sciences, Natural Sciences, Technical Sciences, and other sciences respectively)

Based on Ameriks et al. (2007) we define variables *EIgap*, *TIgap*, *absTIgap*, where:

$$EIgap = \text{expected consumption} - \text{ideal consumption} \quad (3.1)$$

$$TIgap = \text{temptation consumption} - \text{ideal consumption} \quad (3.2)$$

$$absTIgap = |TIgap| \quad (3.3)$$

By consumption we mean consumption of restaurant certificates³ in first year at the expense of the second one. Ideal consumption is given by the answer to the question 11 (See Appendix B), expected consumption is given by the answer to the question 14, and "temptation" consumption is given by the answer to the question 13. While *EIgap* and *TIgap* measures the direction of the consumption problem (i.e. overconsumption if $EIgap > 0$ and underconsumption if $EIgap < 0$), *absTIgap* measures the amplitude of the consumption problems.

Variable *CRT* indicates the score on the aforementioned Cognitive Response Test. Variable *IMP* indicates the "impulsive score" on these answers. Shane (2005) proposed three impulsive responses to his test. (The responses that are the first answers that our brain will come up with and only a patient or trained mind will resist.) In our translation of the questions⁴, these impulsive responses are 100 for question 8 (CRT #1, See Appendix A), 100 for question 9 (CRT #2), and 24 for question 10 (CRT #3). A person receives +1 point to the impulsive score if it answers one of the aforementioned answers to the respective questions. In my analysis both variables *CRT* and *IMP* are

³ In our hypothetical model the respondents were asked how many of the 10 certificates for free dinner would they like to consume in the first year assuming that the rest is used during the following year.

⁴ Question 8 (CRT #1) had to be changed to resemble the Czech monetary system. We believe that simple translation to the Czech language would threaten the meaning of the question in a sense that people would start "over-thinking it" for reasons other than their own self-control. The original question was about dollars, and the correct answer was 5.

never used at the same time, since they both explain the same thing from a different viewpoint, and the results would be ambiguous.

In analysis of the questions 18 to 30 (See Appendix B), all the answers were moved to the left by one, so the answers are now on a scale 0 to 4. The answers used to be on a scale 1 to 5, so the method is $5 \rightarrow 4, \dots, 1 \rightarrow 0$, and each point now represents a 25% increase of how much a person is described by the statement. Questions 18, 19, 21 and 24 are translated questions defining the above mentioned persons' conscientiousness, and are only used as explanatory variables q18, q19, q21, q24. Their means described as percentage in the sample are 74.5%, 60%, 60% and 65.5% respectively.

The reports of income have been summarized into 5 income groups – inc1, inc2, ... inc5. These represent income from 0 to 5 000, 5 000 to 20 000, 20 000 to 35 000, 35 000 to 50 000 and above 50 000 CZK per month respectively. The main variable of interest is inc1, as it is the one present most often in our sample.

3.1 Cognitive Response Test

The average CRT score in the sample is 2.23. Most of the sample (221) in fact achieved the highest possible score of 3, and only 38 people failed to answer any question. The first CRT question (the “ball and a bat” question) was answered correctly by 69.16%, while the impulsive answer “100” was answered in 30.12% of the sample. The second CRT question (the “machines” question) was answered correctly by 75.66%, and the impulsive answer “100” was answered 19.04% of the time. The third CRT question (the “lilies” question) was answered correctly 78.80% of the time, while the impulsive answer “24” was given 16.39% of the time. Answers to different questions like “not 24” were accounted for as simple mistakes not of the impulsive nature. (There were less than 5 of such answers.)

The variable *CRT* represents the CRT score (0 to 3). The variable *IMP* represents the score of the impulsive responses. (i.e. $IMP = 2$ if the impulsive answer was given in two of three possible cases.) The average IMP score in the sample is 0.66.

In the following analysis, we will use terms “*high CRT group*” and “*low CRT group*”. We choose this approach to connect our work more to that of Shane (2005), who used a similar approach. The *high CRT group* is a group of those, who have scored

2 or 3 points in the CRT. This group is significantly larger – it consists of 328 people: 181 men and 147 women. The *low CRT group* is a group of those, who have scored 0 or 1 point in the CRT. It is less than a third of the *high CRT group*. It consists of 87 people: 26 men and 61 women. The two groups are summarized in the Table 2.2.

	High CRT		Low CRT	
	Amount	Part of the group	Amount	Part of the group
male	181	55,18%	26	29,89%
female	147	44,82%	61	70,11%
students	233	71,04%	54	62,07%
entrepreneurs	19	5,79%	4	4,60%
employees	62	18,90%	19	21,84%
unemployed	6	1,83%	3	3,45%
retired	8	2,44%	7	8,05%
without maturity	6	1,83%	2	2,30%
with maturity	317	96,65%	79	90,80%
higher specialized education	1	0,30%	2	2,30%
bachelor's degree	79	24,09%	23	26,44%
master's degree	42	12,80%	11	12,64%
PhD.	3	0,91%	0	0,00%
economists	181	55,18%	28	32,18%
social scientists	30	9,15%	31	35,63%
natural scientists	28	8,54%	4	4,60%
engineers	61	18,60%	6	6,90%
other field of education	21	6,40%	13	14,94%

The linear regression of CRT score as an explained variable (See Appendix C, Table A.1) shows that men score significantly better than women (by 0.3 points). This corresponds to the findings of Shane (2005), Leahey and Guo (2001), or Muller (1998) that men score generally better in math-based tests. The CRT test, although it is designed to measure the person's ability not to report what first comes to mind, is still a math-based test. Other significant determinants are completing secondary education with maturity exam, Social Sciences as a field of study and *q24* (see below). Maturity exam has a strong positive impact on CRT (The coefficient is 0.71.), while Social Sciences have a strong negative relation (The coefficient is -0.65.). This is of course due to the fact, that education in Social Sciences is demanded by people with low mathematic skills. An interesting fact is the statistic significance and the direction of the estimated coefficient (-0.08) of the question 24: "*I often feel that I speak or act too quickly, without thinking about the consequences.*" This means that a person, who feels herself described entirely by the statement, scored *ceteris paribus* 0.32 less than a

person, who does not feel described by the statement at all. When the explained variable is IMP instead of CRT, the statistical and economical significance is smaller: p -value = 0.096, coef. = 0.06. This indicates that awareness of impulsive response problem tends to improve the persons CRT score.

All four conscientiousness questions' variables are not jointly statistically significant at the 10% significance level (p -value = 0.24). Level of education variables are also jointly insignificant at the same level (p -value = 0.15), and field of study variables are jointly statistically significant (p -value < 0.0001).

3.2 Consumption and TI gap

From the analysis of consumption and TI gap, 27 observations were dropped, because they answered "0" on the question "How much CZK would you be willing to pay for the certificate?" Their responses for these questions hold no real meaning.

The ideal consumption preferences in the sample and in the high and low CRT groups are described in Table 2.3. The average ideal consumption in the first year was 5.84.

Table 3.2: Ideal consumption in the first year

Ideal Cons.	All		High CRT		Low CRT	
	Amount	Ratio	Amount	Ratio	Amount	Ratio
0	2	0.52%	2	0.65%	0	0.00%
1	2	0.52%	2	0.65%	0	0.00%
2	6	1.55%	2	0.65%	4	5.06%
3	8	2.06%	6	1.94%	2	2.53%
4	26	6.70%	20	6.47%	6	7.59%
5	198	51.03%	162	52.43%	36	45.57%
6	56	14.43%	43	13.92%	13	16.46%
7	23	5.93%	22	7.12%	1	1.27%
8	16	4.12%	15	4.85%	1	1.27%
9	0	0.00%	0	0.00%	0	0.00%
10	51	13.14%	35	11.33%	16	20.25%

We can see that people mostly want to divide their consumption half for the first year and half for the second. However a significant amount of people want to consume everything in the first year. This tail is larger in the low CRT group, where it is represented by over 20% of the group.

When asked about temptation to deviate from their ideal consumption (question 12, see Appendix B), the people in the sample on average report to be somewhere between no temptation and temptation to slightly overconsume in the first year. The summary of the answers is reported in Table 2.4.

Temptation	All		High CRT		Low CRT	
	Amount	Ratio	Amount	Ratio	Amount	Ratio
Strong underconsumption	10	2.58%	7	2.27%	3	3.80%
Slight underconsumption	59	15.21%	52	16.83%	7	8.86%
None	164	42.27%	123	39.81%	41	51.90%
Slight overconsumption	131	33.76%	108	34.95%	23	29.11%
Strong overconsumption	24	6.19%	19	6.15%	5	6.33%

As we can see, the low CRT group reports less temptation to deviate from the ideal consumption. The inclination to overconsumption is stronger than the inclination to underconsumption, and only 42.27% of the sample reported no expected desire to deviate from the ideal consumption.

Ameriks et al. (2007) report that in their analysis, the EI gap (based on the difference between the expected and ideal consumption) provides explanatory power in measuring a person's net worth and is the more logical choice to use in an analysis. In our analysis of motivation for voluntary restriction, we find the TI gap (based on the difference between the temptation and ideal consumption) to be much more useful. In fact it seems that the question 14 (expected final consumption) was not well understood by the participants of the survey. This could perhaps be due to different translation (e.g. we did not literally translate the word "forecast" which probably leaves a different impression on the reader). Because it held almost no explanatory power at all, the expected consumption and the EI gap will not be mentioned from now on. The consumption in the first year, to which the people would be tempted (the "*temptation consumption*"), is described by the Table 2.5. The mean value in the sample is 6.27, which is 0.43 higher than the mean ideal consumption in the first year.

Table 3.4: Temptation consumption in the first year

Tempt. Cons.	All		High CRT		Low CRT	
	Amount	Ratio	Amount	Ratio	Amount	Ratio
0	2	0.52%	2	0.65%	0	0.00%
1	3	0.77%	2	0.65%	1	1.27%
2	11	2.84%	7	2.27%	4	5.06%
3	21	5.41%	19	6.15%	2	2.53%
4	36	9.28%	28	9.06%	8	10.13%
5	93	23.97%	74	23.95%	19	24.05%
6	46	11.86%	38	12.30%	8	10.13%
7	73	18.81%	57	18.45%	16	20.25%
8	35	9.02%	30	9.71%	5	6.33%
9	13	3.35%	13	4.21%	0	0.00%
10	55	14.18%	39	12.62%	16	20.25%

The fact that people in the sample are more likely to be tempted to overconsume corresponds to the idea that people are more likely to succumb to the direct temptation of having a delicious meal and not having it later. It corresponds less to the findings of Ameriks et al. (2007)⁵. In their sample of college students and graduates, people were more likely to underconsume.

The mean TI gap in the sample is 0.42. 18% of the sample has a negative TI gap (most of them -2 or -1), and 38.92 has a positive TI gap (most of them 2). The rest (43.04%) reported the same temptation consumption as the ideal consumption. The both CRT groups are structurally very similar; the average is slightly higher in the high CRT group (0.43) and slightly lower in the low CRT group (0.39).

The average of absolute value of the TI gap (that measures the amplitude of the temptation problem and not the direction) in the sample is 1.10. For the high CRT group it is 1.16 and for the low CRT group it is 0.87. In over 90% of the sample, the absTIgap is less or equal to 2. This is also true for both the CRT groups.

When asked about the restriction of present consumption (or first time period) in question 15 (see Appendix B), 21.91% of people in the sample answered they would use such a device. The ratio is 19.74% in the high CRT group and 30.38% in the

⁵ In their article, Ameriks et al. also account for the problem of censored variables. They propose that due to the limitation of our question (the limit of 0 and 10 certificates) some overconsumers and underconsumers cannot behave in a way that would reflect their problem. Their solution to the problem is the use of multiple imputation procedure. However their results using the procedure and not using the procedure do not vary significantly. In our work, we are not able to use this method, since we believe we do not have reasonable amount of information about the people in the sample to generate the missing values. Moreover we believe that since the questionnaire was distributed online, people could change their previous answers (i.e. moving from question 14 to question 11). This way they are more likely to answer the questions in a term that reveals their preferences in terms of overconsumption and underconsumption.

low CRT group. When asked the same question about the restriction of the second period in question 16, only 12.63% of the sample was in favor. The numbers for the high and low CRT groups are 20.25% and 10.68% respectively. This indicates that people are willing to accept voluntary self-regulating mechanisms, and that they are more interested in regulating the present consumption than the future consumption. Some people even answered in a way that did not really make sense for their kind of problem. 20% (14) of underconsumers answered they would like to restrict their present consumption, while 9.27% (14) of overconsumers answered they would like to restrict their future consumption. This indicates that they are so tempted to deviate from their ideal consumption that they want to establish a rule for it.

3.3 *Restrictions and commitments*

The explanatory variables in this section were transformed to reflect the percentage to which the statement describes the people in the sample for easier interpretation. (e. g. $q22p = \frac{q22}{4} \times 100$)

In the linear regression of the variable describing answers to the question 22: How well does the statement “Sometimes I take money out of my wallet in fear that I would otherwise spend it.” describe you? (See Appendix C, Table A.2), we can see that with increasing age, such behavior diminishes (by 1.1% per year of age). However this behavior is offset by the significance of the *retired* variable. The estimated coefficient of *retired* is 42.84%, which *ceteris paribus* makes the retired people about 34% more prone to such behavior than the employed people. All four occupation variables are jointly significant at the 10% significance level.

Conscientiousness is also a major factor in evaluation of this statement. Both questions 18 and 24 variables are statistically significant at 1% level, and all the 4 conscientiousness questions are jointly significant at the 1% level. A person giving the highest score to any of the two aforementioned statements would *ceteris paribus* feel about 20% more described by this statement than a person giving it the lowest score possible. (That is the least conscientious person.)

Holding other factors fixed, men feel about 9.7% less described by this statement than women. CRT has a slight negative effect on this variable. Completing the

secondary education with the Maturity exam has a strong negative effect of -28.15%. All the 6 education variables are jointly statistically insignificant at the 10% significance level, and all the 5 field of study variables are jointly insignificant at the 10% level. If TIgap was left in the regression, it would be insignificant, but absTIgap is significant at the 10% level. The only statistically significant income group is the income group 4 (35 000 to 35 000 CZK per month), whose estimated coefficient is also the highest (24.87%).

To summarize, women, younger people, conscientious people, retired people, people with lower CRT score, lower education and higher temptation to deviate from their ideal consumption are more likely to put money out of their wallets in fear of excessive spending. The people in the sample felt that on average, this statement described them on 54.76%. The high and low CRT groups' averages are 52.13% and 64.66% respectively.

In the linear regression of the variable describing the answers to the question 23: How well does the statement “I would not buy a credit card, because I am afraid that I would get into financial distress with one.” describe you (See Appendix C, Table A.3), we can see that the variables we controlled for do not really seem to capture the nature of answering this question. Conscientiousness again seems to have positive impact on evaluating this statement. Estimated coefficient of the 24th question is 6.71%. This means that a person who feels completely described by the statement in 24th question *ceteris paribus* feels 26.84% more described by this statement than a person that does not feel described by the statement in 24th question at all. All the four conscientiousness questions are jointly statistically significant at 1% significance level.

Gender seems to be another important determinant of these answers. Similarly as in the previous statement, holding other factors fixed, men feel 9.77% less described by this statement than women.

Third and last statistically significant variable is the TIgap. The estimated coefficient is -3.04%. This simply means that overconsumers *ceteris paribus* feel less described by this statement. To put it into perspective, a person who would feel tempted to underconsume 2 certificates would feel 12.16% more described by this statement than a person who would feel tempted to overconsume the same amount, holding other factors fixed. Replacing TIgap with absTIgap did not bring any interesting results.

The variables, that reflect the field of study, were jointly insignificant statistically insignificant at the 10% significance level as well as the variables describing the occupation, the variables describing income, and the ones describing the level of education. Again it seems the conscientious people and women are more likely to restrict themselves from easy access to consumer credit. The same is true about underconsumers. It seems that underconsumers are more likely to protect themselves from overconsumption as they probably put too much value on this problem. The estimated mean in the sample on this statement is 52.4%, and 51.6%, 55.46% for high and low CRT groups.

The linear regression of the variable describing the answers to the question 25: How well does the statement: “I hide and lock sweets from myself.” describe you (See Appendix C, Table A.4) surprisingly shows that although the variable describing the answers to the question 20 (How well does the statement “I feel I eat too many sweets.” describe you?) is statistically significant and has the expected direction, the estimated coefficient is only 2.46%. Therefore a person, who feels completely described by this statement, is *ceteris paribus* only 10% more described by the statement in the question 25 than a person, who does not feel described by it at all. This difference however seems bigger if we consider the fact that the statement in the question 25 was the least popular statement and its’ identification average was low, as discussed below.

Some aspects of conscientiousness are again an important factor. However the two statistically significant variables’ (the one describing the question 18 and the one describing the question 19) estimates have opposite direction. The estimates are -2.35 and 3.42 respectively. All the conscientiousness describing variables were not jointly statistically significant at the 10% level of significance.

Higher CRT score again has a negative effect on this voluntary restriction. The difference between the highest and the lowest possible score *ceteris paribus* is -6.79%.

Last variable statistically significant at the 10% significance level is the dummy variable describing income from 20 000 to 35 000 CZK per month. It has a positive effect of 11.04%. All the other variables describing income were both separately and jointly statistically insignificant at the 10% level of significance; however their estimates all had positive signs.

The variables TIgap and absTIgap were not included in the regression, since otherwise they were statistically insignificant, and excluding them allowed us to

increase the size of the sample by the people who did not value the restaurant certificates. (Return to section describing the variables for explanation.)

People who have a problem with excessive consumption of sweets and are aware of this problem are more likely to restrict themselves. So are the people with lower CRT score and people with higher income. Field of study variables and level of education variables were not jointly statistically significant at the 10% level of significance. The average extent to which the person agreed to the statement in the sample is 33.25%. The average values for high and low CRT groups are 31.94% and 38.22%.

Question 26: How well does the statement “When I am facing an important task, I work on it far from TV, games, people and the internet (if this task is not directly connected to internet).” describe you?

This linear regression of the variable describing the answers of this question showed that our explanatory variables fail to explain the nature of this problem. Apart from the R^2 too low even for a microeconomic analysis, the p-value of the F test for overall joint significance of all explanatory variables was unreasonably high (0.44). This is particularly disappointing, since it is the most favorite statement (apart from the statements describing conscientiousness) in the sample. The average score is 69.82%. The values for high and low CRT groups also vary only slightly – they are 69.28% and 71.84% respectively. We can only say that this phenomenon is strongly present in our sample, but we have no strong evidence as to what causes it.

The exact same problem occurs with the question 27: How well does the statement “I buy a season ticket to the sports facilities to motivate myself to visit more often.” describe you? (Notice that the question is asked about the present state and not about a desire to behave in such way.) In this case the p-value of the F-test for overall significance is 0.28. In this regression the only 2 reasonably statistically significant variables are the male variable and the absTIgap variable. Male variable is statistically significant at 1% level of significance and its’ estimated effect is -12.73%. AbsTIgap variable is significant at 10% level and its’ estimated effect is 3.05%.

This indicates that women again are more likely to commit themselves to achieve better discipline in the future. In fact the average value for the variable describing the agreement with question 27 differs greatly between men and women: The value for men is 55.31% and the value for women is 69%. Higher reported level of

temptation to deviate from ideal consumption also seems to increase the person's need of commitment.

The average level of identification with the statement in the sample is 62.17%. The value for high CRT group is 62.73 and the value for low CRT group is 60.06%.

When regressing the variable that represents the 28th question: How well does the statement: "When buying cigarettes, alcohol and sweets, I always try to buy the smallest possible amount." describe you (See Appendix C, Table A.5), the results are more reliable.

Once again the variable describing gender is statistically significant at the 1% level of significance. Men think that this statement *ceteris paribus* describes them 9.9% less than women.

Binary variable that represents whether a person is employed in the public sector is significant at the 5% significance level. Its' estimated regression coefficient is -27.4%. That is a very strong effect. All the occupation variables are not jointly statistically significant at the 10% level of significance.

Students of social sciences are also reported to agree with this statement 17% more. The respective variable is statistically significant at the 10% level of significance. All the field of study variables are also jointly statistically significant at the 10% level of significance. Variables describing level of education are not jointly statistically significant at the 10% level.

Another variable significant at the 1% level is the dummy variable describing monthly income of 5 000 to 20 000 CZK. Estimated coefficient is -10.05. All the other variables describing income above 5 000 CZK have similar estimated coefficients, but are not jointly statistically significant at the 10% level.

Binary variable, that indicates retired people, escaped the 10% level statistical significance (p-value = 0.108), but the estimated coefficient is -36.88, so we feel urged to highlight it.

Answers to this question are again determined by gender, as women report restricting themselves more. The same is true for people with no or very low income. Employees of public sector and retired people report low identification with the statement. The average value in the sample is 59.16%. The values for high and low CRT groups are 57.70% and 64.66%.

The linear regression of the variable describing question 29 (How well does the statement “I would prefer my money to appreciate somewhere, where it is not available to me” describe you?) shows that conscientiousness is a major factor in voluntary liquidity constraint. (See Appendix C, Table A.6) Three of the four variables describing conscientiousness (q18, q19, q24) are statistically significant at the 10% significance level and two of them are significant at the 5% level. All these variables have positive signs and the estimated coefficients are around 3%. To put things into perspective – a person, who agrees with each of these conscientiousness statements more by one point *ceteris paribus* agrees with the statement in q29 more by 9.81%. The difference between a person who is not described by q19 at all and one that is described completely is *ceteris paribus* 15.68%. All the conscientiousness variables are jointly significant at the 1% significance level.

Absolute value of the TIgap also seems to have some effect. It is statistically significant at the 10% significance level and the estimated coefficient is 2.53%. The two largest groups of values of absTIgap – 0 and 2 therefore differ by 5.06% holding other factors fixed.

Variable indicating income group of 5 000 to 20 000 CZK per month statistically differs from the base group at the 5% significance level. The estimated regression coefficient is 8.4%. All the other income variables are statistically insignificant at the 10% level and all 4 income-labeling variables are not jointly statistically significant at the 10% significance level.

Conscientious people and people who think they have a problem with resisting temptation demand voluntary liquidity constraints. It also appears that there is a strong difference between the no income and lower average income groups, where no income group is less interested in such restrictions. This phenomenon can be easily explained. People with no income are usually children and students dependent on their parents. They have no liquidity other than provided by the parents that is most likely less liquidity than they demand. Imposing liquidity restrictions would therefore be useless from the viewpoint of the children.

The variables describing the level of education and the variables describing the field of education were both jointly statistically insignificant at the 10% significance level. The average identification with the statement was 54.94% in the sample. The numbers are 54.80% for the high CRT group and 55.46 for the low CRT group.

The regression of the variable q30 (Question: If you are or were a college student, how well does the statement: “I visited some lectures only because I was afraid I would otherwise see the topic for the first time during the examination period.” Describe you?) is slightly different from the previous regressions (See Appendix C, Table A.7). The lower number of observations is due to the fact that this question was not mandatory as it is aimed only at college students or former students. Also please notice a change in the base group. Students became the base group as opposed to unemployed, and field of study: “other sciences” was added to the base group, since otherwise all the fields of study would appear statistically significant for ambiguous reasons. For those interested, we report that the average level of identification with this statement was highest among the students of economics – 69.09% and lowest among the students of natural sciences – 58.06%. (The other 3 groups’ means were all 62.5%)

The only variable statistically significant at the 5% significance level in the regression is variable q24 describing one of the four conscientiousness questions (See Appendix B). It has the expected positive sign and the estimate is 4.75%. The difference between a person who completely disagrees with the statement in question 24, and one who completely agrees, is therefore *ceteris paribus* 19%. All the four conscientiousness variables are jointly statistically significant at the 1% significance level.

Variables describing level of education, field of education, occupation and monthly income were respectively not jointly statistically significant at the 10% significance level. On average people in the sample identified themselves with the statement by 65.13%, whereas for high and low CRT groups the numbers are 64.43% and 68%.

4. Discussion

The dataset we have collected consists of a large homogenous group of young students (around $\frac{3}{4}$ of the sample) whose highest attained education was secondary with maturity exam and the rest. In terms of gender, we achieved almost perfect half-to-half proportion. The CRT scores were mostly high, and the two established groups – high and low CRT groups – reflect this fact in their sizes. Men were on average more successful in the Cognitive Response Test.

More than half of the people in the sample wanted to divide their fictional certificates in the $\frac{1}{n}$ heuristic. This corresponds to the findings of Huberman and Jiang (2004) who report that this behavior decreases with higher number of choices. Since the example taken from Ameriks et. al (2007) offers only 2 choices, the number of people choosing such behavior is expected to be higher. In their study about 60% of the people preferred equal split, which is 10% more than in our sample. Around 13% of the sample would prefer to consume everything in the first year, and this number increases to 20% in the low CRT group. This corresponds to the findings of Shane (2005), who concludes that higher CRT score comes with higher patience and less impulsiveness.

People in the sample also report to have problems with overconsumption rather than underconsumption, although the number of underconsumers in the sample is not negligible. People in the group with lower CRT score expect lower temptation to deviate from their ideal consumption decision. The expected difference between the ideal and the consumption to which a person would be tempted is rarely (less than 10% of the sample) larger than 2.

About 22% of the sample wanted to impose a rule that would restrict them from overconsumption and 13% would want to restrict themselves from underconsumption.

Conscientiousness is a personality trait more present in the high CRT group. Only in question 19 (“*I never seem to be able to get organized.*”) did the lower CRT group report higher average score. On one hand Shane (2005) claims that higher CRT score is connected with lower preoccupation with person’s future. On the other hand, our results show that it is also connected with higher preoccupation with the present person and her personality. There seems to be no systematic difference between men and women in terms of conscientiousness.

There are three questions inquiring about liquidity constraints in our questionnaire – the questions 22, 23 and 29. One considers taking money out of one’s wallet, the second not getting a credit card and the third one a simple liquidity constraint (See Appendix B). The statements in these questions were, with the exception of the question 25, the least popular ones. The identification with these statements is from 52.5% to 54.75% in the sample. In all of them, conscientiousness is a strong factor that determines peoples’ decisions. It usually has positive direction, i.e. a conscientious person is more likely to restrict her access to money.

Age was a strong determinant of the decision in the out-of-wallet restriction (question 22). In question 29 it escaped the widely used 10% statistical significance level (p -value = 0.137). However in both cases the estimated coefficient was negative. This indicates that older people are less likely to want to restrict their access to money, while younger people might be tempted to do such think to prevent themselves from overconsuming later. Ameriks et al. (2007) discuss that younger people have bigger consumption problems. We propose that they are more likely to restrict themselves from such behavior.

CRT “passed” the statistical significance test only in the case of out-of-wallet restriction, and the estimated coefficient was negative. This corresponds to the previously mentioned lower preoccupation with the future.

According to our analysis, education also only has effect on the first type of liquidity restriction. The effect is again negative. Educated people are most likely more confident in their future behavior.

Perhaps the most typical difference in the answers in our sample was between men and women. The difference was significant in the out-of-wallet and the credit card restriction (question 23). These results correspond to those of Ashraf, Karlan and Yin (2006), who state that women are more likely to use pre-commitment in savings.

Last interesting determinants in voluntary liquidity constraints are TI gap in case of credit card restriction and its absolute value in case of out-of-wallet restriction and savings restriction (question 29). The estimated coefficient of the TI gap is negative, which unfortunately means that overconsumers are less likely to restrict themselves and vice versa. When it comes to the absolute value, the data suggest that people with larger problems with temptation are more likely to restrict themselves.

Inclination to voluntary restrictions from excessive consumption of vices was inspected by the questions 25 (“I hide and lock sweets from myself.”) and 28 (“When buying cigarettes, alcohol and sweets, I always try to buy the smallest possible amount.”). Question 25 achieved the lowest average score of all the questions (33.25%), while question 28 was in the middle (59.16%).

Conscientiousness was an important factor in the first of the two. The effect is a bit ambiguous, but when we take amplitude, p -value, and direction of the less statistically significant variables describing conscientiousness into account (See

Appendix C, Table A.4), the positive effect on voluntary restriction seems to be the stronger one.

Question 20 (“*I feel I eat too many sweets.*”) served only as an identification of the sweets consumption problem, and therefore the estimator of its effect on the answers to the question 25 (“*I hide and lock sweets ...*”) has the expected sign. This indicates that people, who are aware of their consumption problem are also more likely to impose restrictions on themselves. It is worth mentioning that women agreed much more with the statement in the question 20 than men – 20% more on average.

In the question 28 (“*When buying cigarettes and alcohol, ...*”), gender is again an important determinant. The estimator of its effect has the same expected sign, and it also has amplitude very close to the one in the liquidity constraints questions (circa 10%).

Questions 26 (“... I work far from TV, games, people and the internet.”), 27 (“I buy a season ticket to the sports facilities to motivate myself to visit more often.”) and 30 (“... I visited some lectures only because I was afraid I would otherwise see the topic for the first time during the examination period.”) were designed to measure person’s willingness to restrict herself against procrastination. The statements in those were the most popular ones, averaging from 62.17% to 69.82%.

It is therefore disappointing to report that our controlled variables fail to capture the nature of personal decision concerning the voluntary restrictions against procrastination.

Only the last of them – the question 30 – indicates that conscientiousness might again be the force behind the steering wheel.

Nevertheless in the other two questions, we can again trace some effect of gender, since men average much lower than women. The differences are 4.84% in the question 26 and 13.7% in the question 27.

Summary

Our results show, that people in our sample consisting mostly of students, engage or want to engage in various ways of self-regulation and precommitment. 20% of people in the sample in the theoretical example demanded an institutional restriction from overconsumption, and 13% of them demanded an institutional restriction from underconsumption.

When asked about identification with various statements describing different ways of how pre-commitment can prevent excessive consumption, procrastination or consumption of vices, people on average identify themselves with the statements above 50% (with one exception of locking up and hiding sweets). In case of self-commitment against procrastination we fail to find sufficient evidence of what might be the driving forces. Based on the number of people demanding restriction of certificates and average identification of people in the sample with the questionnaire statements, we can say that the answer to our first research question is that people do or do want to commit in various ways a lot.

When it comes to answering our second research question, the strongest finding of our analysis is that women impose restrictions on themselves significantly more than men. Conscientious people, where conscientiousness was measured by a set of arbitrary questions, are more likely to restrict themselves as well.

Cognitive Response Test scores and education seem to have negative effect on self-regulation. This could mean that education, intelligence and patience increase a person's confidence in the future behavior of its myopic self. Whether this confidence is realistic, or whether it is too optimistic is a matter of a future research.

Measure of the gap between an ideal consumption and a consumption to which a person would feel tempted shows, that people with bigger admitted problems, are more willing to impose restrictions on themselves. Whether these problems are admitted based on reality or based on too much conscientiousness is again left for a future study, as we are unable to find out if the people with bigger problems also fail to see them.

The groups we have found as the ones that are more likely to restrict themselves against their future malignant behavior are the ones most easily approachable with various saving programs like SMarT®, education about protection from addiction, or behavioral therapy.

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List of Appendices

Appendix A: The Czech Questionnaire (questionnaire)

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Appendix A: The Czech Questionnaire

Děkuji Vám za Váš zájem. Vyplnění 30 otázek tohoto dotazníku zabere 5-10 minut. (Časově náročnější jsou pouze otázky 8 – 17.) Vámi zadaná data zůstanou zcela anonymní, a budou využita pouze pro zpracování v mé bakalářské práci. Prosím neprobírejte jednotlivé otázky s ostatními účastníky průzkumu dříve, než dotazník odevzdáte, resp. odešlete.

1) Věk:

2) Pohlaví: Muž Žena

3) Zaměstnání:

Student/Studentka Zaměstnanec/Zaměstnankyně Podnikatel/Podnikatelka
 Nezaměstnaný/Nezaměstnaná Důchodce/Důchodkyně

4) Pokud jste zaměstnanec, jste zaměstnán (Jinak ponechte prázdné.):

Ve státním sektoru V soukromém sektoru

5) Nejvyšší dosažené vzdělání:

Základní Střední bez maturity Střední s maturitou Vyšší odborné Vysokoškolské Bc.
 Vysokoškolské magisterské Vysokoškolské doktorské

6) Zaměření studia (Případně ponechte prázdné.):

Ekonomie Jiné sociální a humanitní vědy Přírodní vědy Technika Jiné

7) Příjmová skupina (čistý měsíční příjem v Kč):

0 – 5 000; 5 001 – 10 000; 10 001 – 15 000; 15 001 – 20 000;
 20 001 – 25 000; 25 001 – 30 000; 30 001 – 35 000; 35 001 – 40 000;
 40 001 – 45 000; 45 001 – 50 000 Více než 50 000

8) Pálka a míček stojí dohromady 1 100 Kč. Pálka stojí o 1 000 Kč víc než míček. Kolik Kč stojí míček?

9) Jestliže 5 strojům trvá výroba 5 výrobků 5 minut, kolik minut zabere 100 strojům výroba 100 výrobků?

10) V jezeře rostou lekníny. Každý den se jejich rozloha zdvojnásobí. Jestliže zabrání celého jezera trvá leknínům 48 dní, kolik dní jim trvá zabrání poloviny jezera?

Předpokládejte, že jste vyhrál(-a) 10 poukázek. Každá z těchto poukázek může být směněna (pouze jednou) za "večer v restauraci snů". Během každého takového večera budete Vy i Váš doprovod usazeni u nejlepšího stolu, a obdržíte libovolné množství veškerého jídla a pití, které restaurace nabízí. Náklady pro Vás jsou nulové: všechny platby včetně spropitného jsou součástí výhry. Poukázky jsou k dispozici k okamžitému užití počínaje dnešním večerem, a je absolutně zaručeno, že je budete moci využít v každé restauraci dle vlastní volby pod podmínkou, že je využijete do dvou let. Pokud některé nevyužijete do dvou let, stanou se bezcennými papíry.

Následující otázky mají za cíl zjistit, kolik poukázek byste ideálně využil(-a) v kterém roce, v jakém pokušení byste byl(-a) se od tohoto ideálu odchýlit, a jaké jednání od sebe skutečně očekáváte. (Číselné odpovědi kroužkujte.)

11) Z Vašeho současného pohledu, kolik poukázek byste chtěl(-a) využít v prvním roce? (Zbylé poukázky využijete v druhém roce.)

0 1 2 3 4 5 6 7 8 9 10

12) Někteří lidé mohou být v pokušení v nastalých letech svá rozhodnutí změnit. Která z následujících možností Vás nejvíce vystihuje? (Zaškrtněte pouze jednu možnost.)

Byl(-a) bych v silném pokušení uschovat více poukázek na druhý rok, než jsem původně chtěl(-a).
 Byl(-a) bych v mírném pokušení uschovat více poukázek na druhý rok, než jsem původně chtěl(-a).
 Nebyl(-a) bych v pokušení se odchýlit od původního plánu. – Přeskočte příští otázku.
 Byl(-a) bych v mírném pokušení využít v prvním roce více poukázek, než jsem původně chtěl(-a).
 Byl(-a) bych v silném pokušení využít v prvním roce více poukázek, než jsem původně chtěl(-a).

13) Pokud byste svému pokušení podlehl(-a), kolik poukázek se domníváte, že byste využil(-a) v prvním roce?

0 1 2 3 4 5 6 7 8 9 10

14) Nezávisle na předchozích odpovědích, kolik poukázek se na základě vlastního co nejpřesnějšího odhadu domníváte, že byste nakonec využil(-a)?

0 1 2 3 4 5 6 7 8 9 10

15) Předpokládejte, že byste měl(-a) možnost nechat některé poukázky označit, aby bylo možno je využít pouze v druhém roce. Využil(-a) byste tuto možnost?

Ano Ne

16) Předpokládejte, že byste měl(-a) možnost nechat některé poukázky označit, aby bylo možno je využít pouze v prvním roce. Využil(-a) byste tuto možnost?

Ano Ne

17) Pokud byste si mohl(-a) jednu takovou poukázku zakoupit, kolik Kč byste byl ochoten (/byla ochotna) zaplatit?

Z následujících výroků vyberte (zakroužkujte) na stupnici 1 – 5, kde
1 = výrok mne vůbec nevystihuje; 5 = výrok mne zcela vystihuje

Výrok	Stupnice				
	V ů b e c	Středně			Z c e l a
18) Občas nejsem tak spolehlivý, jak bych si přál být.	1	2	3	4	5
19) Nikdy si nejsem schopen / schopna uspořádat své povinnosti.	1	2	3	4	5
20) Připadá mi, že jím příliš mnoho sladkostí.	1	2	3	4	5
21) Na schůzky často přicházím pozdě.	1	2	3	4	5
22) Občas si z peněženky vyndávám peníze v obavě, že bych je jinak utratil(-a).	1	2	3	4	5
23) Kreditní kartu bych si nepořídil(-a), protože se obávám, že bych se s ní dostal(-a) do finančních problémů. (Pozn.: Kreditní karta je karta, při jejímž použití využíváte bankovní úvěr, čímž se liší od karty debetní, která je spojena s Vaším bankovním účtem.)	1	2	3	4	5
24) Často si připadám, že mluvím nebo jednám příliš rychle, aniž bych přemýšlel(-a) o možných dopadech.	1	2	3	4	5
25) Sladkosti před sebou schovávám a zamykám do skříněk.	1	2	3	4	5
26) Pokud mám před sebou důležitý úkol, pracuji na něm daleko od televize, her, lidí, a internetu (pokud tento úkol s internetem přímo nesouvisí).	1	2	3	4	5
27) Časovou vstupenku (permanentku) do sportovního zařízení si kupuji (/ bych si koupil(-a)), abych se motivoval(-a) k častějším návštěvám.	1	2	3	4	5
28) Při nákupu cigaret, alkoholu či sladkostí se snažím vždy kupovat nejmenší možné množství.	1	2	3	4	5
29) Nejraději bych své peníze zhodnotil(-a) někde, kde k nim nebudu mít přístup.	1	2	3	4	5
30) Jste-li, nebo byl(-a)-li jste vysokoškolský student: Některé přednášky jsem navštěvoval(-a) jen protože jsem se bál(-a), že jinak se s látkou předmětu poprvé seznámím až ve zkouškovém období.	1	2	3	4	5

Appendix B: The English Questionnaire

Thank you for your interest. Answering 30 questions of this questionnaire will take 5 – 10 minutes (More time consuming are only questions 8 – 17.) Your data will stay strictly anonymous, and will only be used in creating my bachelor's thesis. Please do not discuss the questions with other participants before the questionnaires are handed out or sent.

1) Age:

2) Gender: Male Female

3) Occupation:

Student Employed Entrepreneur
 Unemployed Retired

4) If you are employed, you are employed (Otherwise leave empty.)

In the state sector In the private sector

5) Highest attained level of education: (m.e. = maturity exam)

Basic Secondary without m.e. Secondary with m.e. Higher specialized
 College Bachelor College Master College Ph.D.

6) Field of study (Possibly leave blank.):

Economics Other social and human sciences Natural Sciences Engineering Other

7) Income group (net monthly income in CZK):

0 – 5 000; 5 001 – 10 000; 10 001 – 15 000; 15 001 – 20 000;
 20 001 – 25 000; 25 001 – 30 000; 30 001 – 35 000; 35 001 – 40 000;
 40 001 – 45 000; 45 001 – 50 000 More than 50 000

8) A bat and a ball cost 1 100 CZK in total. The bat costs \$1000 more than the ball. How much does the ball cost?

9) If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?

10) In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

Suppose that you win 10 certificates, each of which can be used (once) to receive a "dream restaurant night." On each such night, you and a companion will get the best table and an unlimited budget for food and drink at a restaurant of your choosing. There will be no cost to you: all payments including gratuities come as part of the prize. The certificates are available for immediate use, starting tonight, and there is an absolute guarantee that they will be honored by any restaurant you select if they are used within a two year window. However if they are not used up within this two year period, any that remain are valueless.

The questions below concern how many of the certificates you would ideally like to use in each year, how tempted you would be to depart from this ideal, and what you expect you would do in practice. (Circle the numeral answers)

11) From your current perspective, how many of the certificates would you like to use in year 1? (You will use the rest in the next year.)

0 1 2 3 4 5 6 7 8 9 10

12) Some people might be tempted to depart from their ideal allocation in the forthcoming years. Which of the following describes you? (Mark only one.)

- I would be strongly tempted to keep more certificates for the use in the second year than I wanted previously.
 I would be somewhat tempted to keep more certificates for use in the second year than I wanted previously.
 I would have no temptation in either direction - Skip the next question.
 I would be somewhat tempted to use more certificates in the first year than I wanted previously.
 I would be strongly tempted to use more certificates in the first year than I wanted previously.

13) If you were to give in to your temptation, how many certificates do you think you would use in year 1 as opposed to year 2?

0 1 2 3 4 5 6 7 8 9 10

14) Independently on the previous answers, based on your most accurate forecast of how many certificates do you think you would end up using?

0 1 2 3 4 5 6 7 8 9 10

15) Suppose that you had the option to restrict some of the certificates for use only in the second year. Would you use this option?

Yes No

16) Suppose that you had the option to restrict some of the certificates for use only in the first year. Would you use this option?

Yes No

17) If you could buy one such certificate, how much CZK would you be willing to pay?

From the forthcoming statements choose (circle) on a scale 1 – 5, where
1 = the statement does not describe me at all; 5 = the statement completely describes me

Statement	N o	Scale				F u l l y
		Moderate				
18) Sometimes I am not as dependable or reliable as I should be.	1	2	3	4	5	
19) I never seem able to get organized.	1	2	3	4	5	
20) I feel I eat too many sweets.	1	2	3	4	5	
21) I am often late for appointments.	1	2	3	4	5	
22) Sometimes I take money out of my wallet in fear that I would otherwise spend it.	1	2	3	4	5	
23) I would not buy a credit card, because I am afraid that I would get into financial distress with one. (Note: A credit card is based on credit, which separates it from debit card, which is connected with your bank account.)	1	2	3	4	5	
24) I often feel that I speak or act too quickly, without thinking about the consequences.	1	2	3	4	5	
25) I hide and lock sweets from myself.	1	2	3	4	5	
26) When I am facing an important task, I work on it far from TV, games, people and the internet (if this task is not directly connected to internet).	1	2	3	4	5	
27) I buy a season ticket to the sports facilities to motivate myself to visit more often.	1	2	3	4	5	
28) When buying cigarettes, alcohol and sweets, I always try to buy the smallest possible amount.	1	2	3	4	5	
29) I would prefer my money to appreciate somewhere, where it is not available to me.	1	2	3	4	5	
30) If you are or were a college student: I visited some lectures only because I was afraid I would otherwise see the topic for the first time during the examination period.	1	2	3	4	5	

Appendix C: Regression Tables

Table A.1: Linear regression of CRT score

HC3 robust SE		Number of obs.		415		
		F(24, 390)		5.03		
		Prob > F		0.0000		
		R-squared		0.2432		
		Root MSE		0.8808		
Variable	Coef.	Std. Err.	t	P>t	95% Conf. Interval	
age	-0.010	0.008	-1.24	0.214	-0.0258	0.0058
male ***	0.294	0.097	3.02	0.003	0.1025	0.4848
student	0.091	0.459	0.20	0.842	-0.8113	0.9940
entrepreneur	-0.182	0.552	-0.33	0.742	-1.2681	0.9042
employee	-0.060	0.506	-0.12	0.905	-1.0548	0.9344
retired	-0.539	0.602	-0.90	0.371	-1.7219	0.6434
edu2	0.528	0.516	1.02	0.307	-0.4864	1.5424
edu3 **	0.710	0.281	2.53	0.012	0.1578	1.2623
edu4	-0.571	0.528	-1.08	0.280	-1.6080	0.4668
edu5	-0.026	0.148	-0.18	0.861	-0.3160	0.2643
edu6	0.186	0.214	0.87	0.386	-0.2347	0.6061
edu7	-0.014	0.658	-0.02	0.983	-1.3076	1.2796
economist	0.207	0.201	1.03	0.305	-0.1888	0.6021
socialsc ***	-0.652	0.246	-2.65	0.008	-1.1357	-0.1692
natursc	0.290	0.228	1.27	0.204	-0.1579	0.7380
techsc	0.325	0.206	1.57	0.116	-0.0807	0.7298
q18	0.052	0.045	1.17	0.243	-0.0357	0.1404
q19	-0.017	0.050	-0.35	0.728	-0.1156	0.0809
q24 **	-0.083	0.042	-2.00	0.046	-0.1649	-0.0016
q21	0.040	0.037	1.07	0.285	-0.0335	0.1137
inc2	-0.148	0.102	-1.45	0.148	-0.3477	0.0524
inc3	0.076	0.216	0.35	0.726	-0.3489	0.5005
inc4	0.477	0.423	1.13	0.260	-0.3540	1.3082
inc5	0.247	0.385	0.64	0.521	-0.5089	1.0034
_cons	1.579	0.567	2.79	0.006	0.4655	2.6934

* - significant at 10% signif. level, ** - at 5% signif. level, *** - at 1% signif. level

base group = female, unemployed, basic education, income less than 5 000 CZK

Table A.2: Out-of-wallet restriction (Q22)

HC3 robust SE		Number of obs.		388		
		F(24, 390)		5.28		
		Prob > F		0.0000		
		R-squared		0.2268		
		Root MSE		31.771		
Variable	Coef.	Std. Err.	t	P>t	95% Conf. Interval	
age***	-1.104	0.264	-4.18	0.000	-1.6242	-0.5848
q18***	4.805	1.643	2.93	0.004	1.5754	8.0356
q19	0.276	1.834	0.15	0.881	-3.3314	3.8831
q21	-0.630	1.448	-0.43	0.664	-3.4778	2.2186
q24***	5.910	1.591	3.72	0.000	2.7818	9.0385
male**	-9.722	3.840	-2.53	0.012	-17.2732	-2.1716
student	2.197	10.624	0.21	0.836	-18.6957	23.0895
entrepreneur	9.431	13.300	0.71	0.479	-16.7246	35.5871
employee	8.750	10.860	0.81	0.421	-12.6056	30.1065
retired***	42.838	14.560	2.94	0.003	14.2050	71.4703
crt*	-3.405	1.958	-1.74	0.083	-7.2555	0.4464
edu2	-0.925	18.784	-0.05	0.961	-37.8650	36.0157
edu3**	-28.147	10.947	-2.57	0.011	-49.6751	-6.6180
edu4	-33.680	111.947	-0.3	0.764	-253.8308	186.4717
edu5	-3.142	5.441	-0.58	0.564	-13.8411	7.5577
edu6	4.222	8.215	0.51	0.608	-11.9333	20.3778
edu7	21.078	33.251	0.63	0.527	-44.3115	86.4680
economist	13.656	9.627	1.42	0.157	-5.2755	32.5871
socialsc	14.172	10.469	1.35	0.177	-6.4169	34.7608
natursc	11.541	11.165	1.03	0.302	-10.4156	33.4971
techsc	11.797	9.909	1.19	0.235	-7.6901	31.2846
othersc	11.378	10.483	1.09	0.278	-9.2379	31.9934
absTlgap*	3.352	1.715	1.95	0.051	-0.0204	6.7242
inc2	0.872	4.339	0.2	0.841	-7.6600	9.4042
inc3	6.234	8.548	0.73	0.466	-10.5751	23.0437
inc4*	24.871	12.803	1.94	0.053	-0.3079	50.0499
inc5	7.879	9.624	0.82	0.413	-11.0466	26.8053
_cons	70.766	17.469	4.05	0.000	36.41	105.12

* - significant at 10% signif. level, ** - at 5% signif. level, *** - at 1% signif. Level

base group = female, unemployed, basic education, income less than 5 000 CZK

Table A.3: Credit card restriction (Q23)

HC3 robust SE		Number of obs.	388			
		F(27, 360)	1.59			
		Prob > F	0.0329			
		R-squared	0.1247			
		Root MSE	35.279			
Variable	Coef.	Std. Err.	t	P>t	95% Conf. Interval	
age	0.040	0.367	0.11	0.912	-0.6821	0.7631
q18	-1.539	1.947	-0.79	0.430	-5.3668	2.2896
q19	2.110	2.262	0.93	0.352	-2.3392	6.5584
q21	2.107	1.626	1.3	0.196	-1.0897	5.3043
q24***	6.712	1.692	3.97	0.000	3.3856	10.0387
male**	-9.772	4.110	-2.38	0.018	-17.8560	-1.6888
student	-0.192	16.281	-0.01	0.991	-32.2096	31.8263
entrepreneur	15.539	17.535	0.89	0.376	-18.9441	50.0219
employee	13.700	15.340	0.89	0.372	-16.4674	43.8677
retired	1.328	19.073	0.07	0.945	-36.1813	38.8364
crt	0.155	2.241	0.07	0.945	-4.2520	4.5615
edu2	24.553	22.669	1.08	0.279	-20.0271	69.1329
edu3	7.508	10.447	0.72	0.473	-13.0367	28.0523
edu4	-75.156	67.838	-1.11	0.269	-208.5642	58.2517
edu5	2.162	6.540	0.33	0.741	-10.6988	15.0234
edu6	-10.976	9.837	-1.12	0.265	-30.3209	8.3690
edu7	37.711	31.996	1.18	0.239	-25.2102	100.6331
economist	17.268	15.439	1.12	0.264	-13.0936	47.6306
socialsc	17.219	16.679	1.03	0.303	-15.5810	50.0185
natursc	16.563	16.273	1.02	0.309	-15.4389	48.5658
techsc	18.138	15.688	1.16	0.248	-12.7144	48.9901
othersc	7.669	15.899	0.48	0.630	-23.5979	38.9363
Tigap**	-3.043	1.371	-2.22	0.027	-5.7392	-0.3470
inc2	-2.212	4.448	-0.5	0.619	-10.9599	6.5362
inc3	-7.157	9.012	-0.79	0.428	-24.8792	10.5653
inc4	5.225	21.510	0.24	0.808	-37.0757	47.5263
inc5	8.296	14.490	0.57	0.567	-20.1996	36.7912
_cons	10.052	24.136	0.42	0.677	-37.41	57.52

* - significant at 10% signif. level, ** - at 5% signif. level, *** - at 1% signif. Level

base group = female, unemployed, basic education, income less than 5 000 CZK

Table A.4: Food restriction (Q25)

HC3 robust SE		Number of obs.			415
		F(28, 357)			1.52
		Prob > F			0.0474
		R-squared			0.145
		Root MSE			20.481
Variable	Coef.	Std. Err.	t	P>t	95% Conf. Interval
age	-0.125	0.213	-0.59	0.557	-0.5443 0.2937
q18*	-2.347	1.218	-1.93	0.055	-4.7406 0.0473
q19**	3.420	1.475	2.32	0.021	0.5205 6.3198
q21	1.397	1.003	1.39	0.164	-0.5740 3.3681
q24	1.255	1.093	1.15	0.252	-0.8940 3.4031
male	-1.086	2.867	-0.38	0.705	-6.7232 4.5513
student	-9.036	11.062	-0.82	0.415	-30.7845 12.7135
entrepreneur	-13.859	12.488	-1.11	0.268	-38.4119 10.6935
employee	-14.433	12.303	-1.17	0.241	-38.6223 9.7564
retired	-7.121	17.723	-0.40	0.688	-41.9672 27.7253
crt*	-2.264	1.241	-1.82	0.069	-4.7044 0.1772
edu2	6.660	8.286	0.80	0.422	-9.6320 22.9517
edu3	1.942	4.321	0.45	0.653	-6.5535 10.4379
edu4	33.494	30.840	1.09	0.278	-27.1407 94.1278
edu5	1.900	3.962	0.48	0.632	-5.8904 9.6909
edu6	-2.245	5.408	-0.42	0.678	-12.8778 8.3871
edu7	0.746	13.191	0.06	0.955	-25.1886 26.6805
economist	9.055	6.050	1.50	0.135	-2.8406 20.9502
socialsc	6.132	6.490	0.94	0.345	-6.6283 18.8928
natursc	7.859	7.012	1.12	0.263	-5.9280 21.6463
techsc	5.283	5.534	0.95	0.340	-5.5976 16.1637
othersc	2.928	6.643	0.44	0.660	-10.1318 15.9884
inc2	3.858	2.712	1.42	0.156	-1.4728 9.1898
inc3**	11.040	5.373	2.05	0.041	0.4757 21.6042
inc4	5.217	7.474	0.70	0.486	-9.4777 19.9113
inc5	11.106	8.309	1.34	0.182	-5.2310 27.4422
q20***	2.456	0.918	2.68	0.008	0.6511 4.2600
_cons	24.680	11.446	2.16	0.032	2.1752 47.1844

* - significant at 10% signif. level, ** - at 5% signif. level, *** - at 1% signif. Level

base group = female, unemployed, basic education, income less than 5 000 CZK

Table A.5: Vices consumption restriction (Q28)

HC3 robust SE		Number of obs.		388		
		F(28, 357)		2.11		
		Prob > F		0.001		
		R-squared		0.1343		
		Root MSE		29.399		
Variable	Coef.	Std. Err.	t	P>t	95% Conf. Interval	
age	0.600	0.440	1.36	0.174	-0.2659	1.4667
q18	0.291	1.588	0.18	0.855	-2.8312	3.4137
q19	-0.295	1.751	-0.17	0.866	-3.7376	3.1475
q21	0.397	1.418	0.28	0.780	-2.3907	3.1848
q24	2.038	1.429	1.43	0.155	-0.7714	4.8480
male***	-9.923	3.537	-2.81	0.005	-16.8783	-2.9671
student	-9.937	15.807	-0.63	0.530	-41.0238	21.1490
entrepreneur	-8.835	16.612	-0.53	0.595	-41.5042	23.8347
employee	2.057	15.958	0.13	0.898	-29.3265	33.4403
retired	-36.880	22.899	-1.61	0.108	-81.9130	8.1527
public**	-27.406	10.819	-2.53	0.012	-48.6826	-6.1286
crt	-0.790	1.959	-0.40	0.687	-4.6427	3.0618
edu2	-15.577	14.423	-1.08	0.281	-43.9418	12.7881
edu3	-0.313	8.235	-0.04	0.970	-16.5089	15.8825
edu4	-5.192	19.557	-0.27	0.791	-43.6520	33.2676
edu5	-3.826	4.904	-0.78	0.436	-13.4693	5.8181
edu6	-0.961	7.925	-0.12	0.904	-16.5453	14.6234
edu7	1.470	14.671	0.10	0.920	-27.3827	30.3225
economist	8.643	9.627	0.90	0.370	-10.2888	27.5752
socialsc*	17.126	10.364	1.65	0.099	-3.2556	37.5067
natursc	-1.674	10.745	-0.16	0.876	-22.8046	19.4566
techsc	6.144	10.135	0.61	0.545	-13.7870	26.0753
othersc	9.687	10.317	0.94	0.348	-10.6016	29.9759
absTlgap	2.157	1.568	1.38	0.170	-0.9274	5.2416
inc2***	-10.054	3.854	-2.61	0.009	-17.6341	-2.4749
inc3	-11.253	7.084	-1.59	0.113	-25.1841	2.6787
inc4	-13.153	19.037	-0.69	0.490	-50.5916	24.2846
inc5	-12.813	13.230	-0.97	0.333	-38.8304	13.2040
_cons	50.696	22.296	2.27	0.024	6.8479	94.5439

* - significant at 10% signif. level, ** - at 5% signif. level, *** - at 1% signif. Level

base group = female, unemployed, basic education, income less than 5 000 CZK

Table A.6: Liquidity restriction (Q29)

HC3 robust SE		Number of obs.		388		
		F(27, 360)		2.15		
		Prob > F		0.0009		
		R-squared		0.1341		
		Root MSE		30.495		
Variable	Coef.	Std. Err.	t	P>t	95% Conf. Interval	
age	-0.444	0.298	-1.49	0.137	-1.0299	0.1420
q18*	2.748	1.581	1.74	0.083	-0.3613	5.8567
q19**	3.922	1.836	2.14	0.033	0.3105	7.5329
q21	-1.455	1.385	-1.05	0.294	-4.1774	1.2683
q24**	3.141	1.531	2.05	0.041	0.1296	6.1528
male	-2.452	3.591	-0.68	0.495	-9.5146	4.6098
student	-14.809	14.290	-1.04	0.301	-42.9122	13.2936
entrepreneur	7.795	17.190	0.45	0.651	-26.0112	41.6003
employee	-0.108	14.543	-0.01	0.994	-28.7091	28.4922
retired	2.528	18.450	0.14	0.891	-33.7555	38.8119
crt	1.160	1.824	0.64	0.525	-2.4271	4.7475
edu2	15.474	17.887	0.87	0.388	-19.7031	50.6507
edu3	3.477	9.477	0.37	0.714	-15.1603	22.1152
edu4	-34.192	60.634	-0.56	0.573	-153.4323	85.0489
edu5	-3.924	5.590	-0.70	0.483	-14.9181	7.0695
edu6	-0.670	8.302	-0.08	0.936	-16.9965	15.6557
edu7	4.727	23.970	0.20	0.844	-42.4123	51.8668
economist	0.492	16.249	0.03	0.976	-31.4635	32.4474
socialsc	0.152	16.479	0.01	0.993	-32.2562	32.5599
natursc	2.440	17.026	0.14	0.886	-31.0421	35.9226
techsc	-5.404	16.675	-0.32	0.746	-38.1976	27.3895
othersc	10.412	16.488	0.63	0.528	-22.0136	42.8367
absTlgap*	2.535	1.535	1.65	0.100	-0.4841	5.5533
inc2**	8.400	3.908	2.15	0.032	0.7149	16.0853
inc3	-9.941	7.995	-1.24	0.215	-25.6633	5.7813
inc4	-8.329	12.349	-0.67	0.500	-32.6144	15.9556
inc5	-10.898	12.212	-0.89	0.373	-34.9143	13.1178
_cons	53.814	21.674	2.48	0.013	11.1915	96.4372

* - significant at 10% signif. level, ** - at 5% signif. level, *** - at 1% signif. Level

base group = female, unemployed, basic education, income less than 5 000 CZK

Table A.7: Procrastination restriction (Q30)

HC3 robust SE		Number of obs.		359		
		F(26, 332)		1.99		
		Prob > F		0.0033		
		R-squared		0.1036		
		Root MSE		36.936		
Variable	Coef.	Std. Err.	t	P>t	95% Conf. Interval	
age	0.189	0.383	0.49	0.621	-0.5634	0.9416
q18	-0.636	2.203	-0.29	0.773	-4.9688	3.6966
q19	3.756	2.512	1.50	0.136	-1.1853	8.6971
q21	2.597	1.787	1.45	0.147	-0.9174	6.1123
q24**	4.751	1.846	2.57	0.011	1.1193	8.3820
male	1.271	4.601	0.28	0.783	-7.7800	10.3219
entrepreneur	-14.753	12.799	-1.15	0.250	-39.9304	10.4240
employee	-3.531	10.902	-0.32	0.746	-24.9778	17.9152
unemployed	19.619	18.895	1.04	0.300	-17.5499	56.7873
retired	-25.361	18.441	-1.38	0.170	-61.6368	10.9150
crt	-3.531	2.417	-1.46	0.145	-8.2866	1.2237
edu2	-11.471	35.438	-0.32	0.746	-81.1823	58.2404
edu3	13.012	28.611	0.45	0.650	-43.2697	69.2943
edu4	-44.219	133.771	-0.33	0.741	-307.3646	218.9258
edu5	-0.103	6.648	-0.02	0.988	-13.1805	12.9739
edu6	-10.009	10.616	-0.94	0.346	-30.8915	10.8739
edu7	-11.673	21.833	-0.53	0.593	-54.6217	31.2748
economist	13.754	9.792	1.40	0.161	-5.5090	33.0166
socialsc	3.554	10.604	0.34	0.738	-17.3066	24.4142
natursc	6.089	13.275	0.46	0.647	-20.0243	32.2029
techsc	13.481	10.543	1.28	0.202	-7.2585	34.2208
Tlgap	-2.030	1.440	-1.41	0.159	-4.8620	0.8018
inc2	-2.885	4.905	-0.59	0.557	-12.5330	6.7631
inc3	2.854	10.254	0.28	0.781	-17.3160	23.0248
inc4	10.485	28.164	0.37	0.710	-44.9177	65.8883
inc5	-3.521	13.397	-0.26	0.793	-29.8743	22.8331
_cons	22.949	30.215	0.76	0.448	-36.4882	82.3865

* - significant at 10% signif. level, ** - at 5% signif. level, *** - at 1% signif. Level

base group = female, student, basic education, income less than 5 000 CZK, other sciences