Erasmus University of Rotterdam
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MASTER THESIS

How compensation plans affect people's Life Cycle theory of Consumption and Saving

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Rotterdam, August 2015

Contents

Abstract

In the following study I examine the effect of different compensation plans on employees' **risk attitude**, **rate of discounting** and **raving rate**. I predict that compensation plans offering floating salaries, that is wage raises based on the years of employment (later mentioned as SMarT type), will come with the effects of **more risk averse** profiles, **more patience (low discount rate)** and **higher saving rate**. I use an online survey to measure and categorize the profiles of individuals regarding the three different economic elements of employees mentioned above.

The findings of the thesis do not show any causal relation between the type of compensation plan and the three variables that describe economic behavior. That is why the econometric models used suffered in terms of explanatory power. It would be interesting to mention, though, that the findings showed some indication on the hypotheses, since in all the cases the forecasted relation was actually observed in the models. Nevertheless, other indicators such as years of experience or participants' perceived economic condition seem to significantly affect the probabilities for risk loving, discounting and saving.

Future implications of this research include testing for applicability in real companies' employees and investigation of whether pension schemes have an effect on economic behavior as it is described by the three aforementioned elements. The potential findings from people that are actually under SMarT type of compensation plans will, for sure, be more realistic and they could possibly underline a causal relation with risk attitude, discounting rate and saving rate.

Introduction

In an era when countries and governments try to form economic collaborations and unions, usually aiming to economic convergence, dealing with issues such as uncertainty, adaptation, inequality and policy coherence is more than imperative. That is because these social and financial disturbances may come from false decisions and designs regarding the preferences of the people that support these economic unions. And as a result, policies may end up being inefficient both socially and economically with a risk to implement a strategy leading to a not sustainable future. Conclusively, it seems as the ability to foreseeing the relation of the way economies work with our everyday economic decisions is extremely important if not indispensable.

This thesis attempts to test theories of Behavioral Economics over actual beliefs and profiles of employees to find out the connection between human behavior and economic action. To be more precise, it will attempt to investigate the relation of saving rate, risk attitude and discounting of future gains with different types of salary, if there is any.

Behavioral Economics - A short historical overview

During the last few decades, Behavioral Economics has introduced topical insights in the general discipline of Economics, through the adaptation of a variety of psychological foundations. More and more attention has been raised by "the role of emotion in peoples' decision making which in many circumstances leads to systematic and predictable errors" (Kahneman, 2003). However, even if Behavioral Economics still remains an up and coming field it is not a new concept.

Adam Smith himself acknowledged the role of human nature in Economics pointing out that "How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortune of other's[…]" (Smith & Haakonssen, 2002). But it took more than 200 years until Behavioral Economics managed to become popular among scientists. According to Camerer, Rabin and Loewenstein (2003), the rise of Psychology in the 20th century was followed by some early attempts on describing consumer's choices by Fisher, Pareto and later Keynes. This early boost was the incentive needed by psychology-oriented economists to offer an alternative to the generally accepted notion of the mathematization of economic theories of 1900's. Although, it seemed that within the academic cycles of the time the hope of a generic "Natural Science" was a trend (Angner & Loewenstein, 2006), the new form of mathematized economics brought some attention but not alteration to the applied science and practice.

In more recent years, many other academics such as Allais, Ellsberg, Kahneman, Tversky and Thaler also focused their research on Behavioral Economics, since history was exposing anomalies of the neoclassical theory that led to false forecasting of economic events (Angner & Loewenstein, 2006).

Particularly, in terms of finance, Behavioral Economics seems to have a lot to contribute to. Most of financial equilibrium models assume that investors are fully informed and only take asset risks into consideration if their marginal utility is affected (Camerer, Loewenstein & Rabin, 2003). The above vital hypotheses of finance are based on the belief that investors are rational economic thinkers[1], a very strong assumption that recent economic theory insist to - at least partially - turn down. This anomaly was the inspiration for many economists to try to empirically demonstrate inaccuracies produced by traditional financial models.

However, the fact that the so called "homo-economicus[2]" seems not to exist in real life, is not necessarily frustrating. It looks promising that the interaction of Economics and Psychology can offer a new point of view to recent economic problems, and even solutions. As the field of Behavioral Economics is trying to explain human (ir)rationality and make more concrete remarks, this thesis will also try to use concepts of Behavioral Economics and Behavioral Finance to test some simple hypotheses regarding peoples' economic choices and behavior.

Life - Cycle theory of Consumption and Saving

Based on the aforementioned assumptions of financial equilibria and rationality, empirically researched and criticized, many theories have been developed over the years, concerning consumption and saving. Until the 1950's, it was common among economists to believe that the saving rate was strongly connected to the "absolute income"[3] of a family and not to the income relatively to the overall mean of it (Modigliani, 1986). This was when

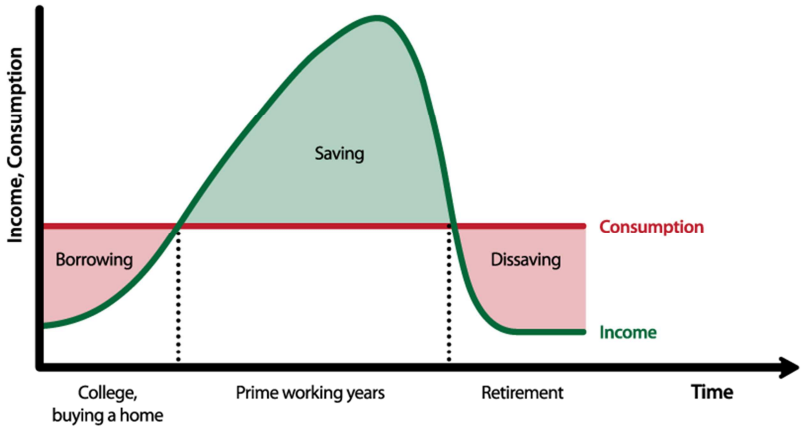
[1] **Rational economic thinker:** It is a vital concept of neoclassical economics to identify and describe agents – the "players" of the economic system. The assumption is that agents are fully and perfectly informed, trying to achieve the most optimal individual benefit based on their preferences (Arnsperger and Varoufakis, 2006)

[2] **Homo-economicus:** Economic man, or the rational agent depicted in economic models. Such an agent has consistent and stable preferences; he is entirely forward-looking, and pursues only his own self-interest. When given options he chooses the alternative with the highest expected utility for himself. It is controversial whether this figure is realistic, and if not, how much that matters to economic theory. The definition was introduced by John Stuart Mill in 1848 (Oxfordreference.com, 2015)

[3] **Absolute income:** A theory developed by John Maynard Keynes which puts forward the idea that consumption will rise as income rises. (Oxfordreference.com, 2015)

the Life - Cycle Theory was introduced and changed what was believed before. The theory argued that households (or individuals) tend to maintain a stable level of consumption along time. In order to achieve that, they need to experience different stages of money allocation.

Figure 1: The Life-Cycle theory graph



Source: Research.stlouisfed.org, 2015

Figure 1 describes a simple version of Life – Cycle theory. As it shows, during the early years of life, when no fixed income is earned, an individual would have to borrow for fulfilling needs such as financing their studies. After entering working life, a stable level of income is received, offering the option to meet needs and desires plus save an amount of money (either to repay older loans or to get prepared for retirement). Lastly, during retirement age, a lower level of income is usually earned which is simply not enough to cover extra expenses (eg. increased health related costs). Again, in order to achieve a good standard of living, someone would need to dissave. Many researchers accepted the Life – Cycle theory as "the standard way that economists think about the intertemporal allocation of time, effort and money" (Browning and Crossley, 2001).

It is important to mention that the theory engenders a debate among scientists from its birth until today. Although, Life – Cycle theory introduced a good and brief pattern of how money should be distributed within a lifetime, it is based on the powerful and controversial assumptions of finance questioned by several researchers (Samuelson and Zeckhauser, 1988). Modigliani, himself, admitted that regularities like people's rational thinking and utility maximization are not empirically plausible but need to be accepted to build up on (Modigliani, 1986).

More concerns were added to the ones like Modigliani's, regarding theories that explain a pattern of consuming and saving. Not all opinions opposing to the validity of Life - Cycle theory come from behavioral economists, though. Shefrin and Thaler (1988) highlighted an additional fundamental problem to the consuming/saving habits: Households do not save as if they knew how to calculate the annuity value of money input. Even among

the few that are capable of doing so, there is a chance they do not actually do it in practice (Shefrin and Thaler, 1988). In addition, they introduced a model that takes into account behavioral aspects such as self-control levels and mental accounting and resulted that a single utility function can not consistently describe economic behavior. Mental accounting is a behavioral notion introduced by economist Richard Thaler, which supports that individuals divide their current and future assets into separate groups. With mental accounting, people assign different levels of utility to each asset group, which affects their consumption decisions. Interestingly enough, Shefrin and Thaler also believe that many "irrelevant" factors, once neglected, as the form of salary payment may influence consumption and saving rate at a significant level (Shefrin and Thaler, 1988).

Of course, Life – Cycle theory is in no case empty (Shefrin and Thaler, 1988) but the behavioral insights recently added, changed the content of questions like "how much should I save" and "how much can I save" in order to balance status overtime in a constantly changing environment. Questions that puzzle many at different stages of life.

Save More Tomorrow (SMarT)

Some years later, the before mentioned concerns and critique became the input of new theories which didn't assume that people always act rationally. The main hypothesis changed as economists argued that individuals do not share a common organizing profile (Mitchell and Utkus, n.d.) since they are affected by many different behavioral biases (Benartzi and Thaler, 2007).

Concerning saving, people seem to often deviate from the general laws of Life – Cycle theory. According to the research of Lusardi et al. (2009), some of the key barriers in terms of low saving rates are insufficient information on how to save and the reluctance of low-paid employees to plan for retirement (Lusardi et al., 2009). They also claim that age plays a vital role since youngers usually do not know where to start when it comes to saving for retirement (Lusardi et al., 2009).

Thaler and Shefrin, on the other hand, argue that individuals do not achieve desired levels of savings because of what the model of self-control introduces (Thaler and Shefrin, 1981). This model supports that individuals act like organizations which contain farsighted planners and myopic doers. This resulting conflict of "different personal selves" in terms of thinking could be balanced through the use of rules and short term goals that the individual should impose to them (Thaler and Shefrin, 1981).

However, the problem of insufficient saving does not only interest researchers. According to the Organization of Economic Co-operation and Development (OECD) the last

few years “the use of behavioral economics by governments and regulators is a growing trend globally, most notably in the United Kingdom and United States” and more recently in countries like Australia, Netherlands, New Zealand and others (Oecd.org, 2015). The Behavioral insights team founded in the UK in 2010 “as the world’s first government institution dedicated to the application of behavioral sciences”, is an example. Their mission is to help with the application and implementation of behavioral economics in order to support social purpose goals, through policy development, seminars, organizational workshops and more (Behaviouralinsights.co.uk, 2015).

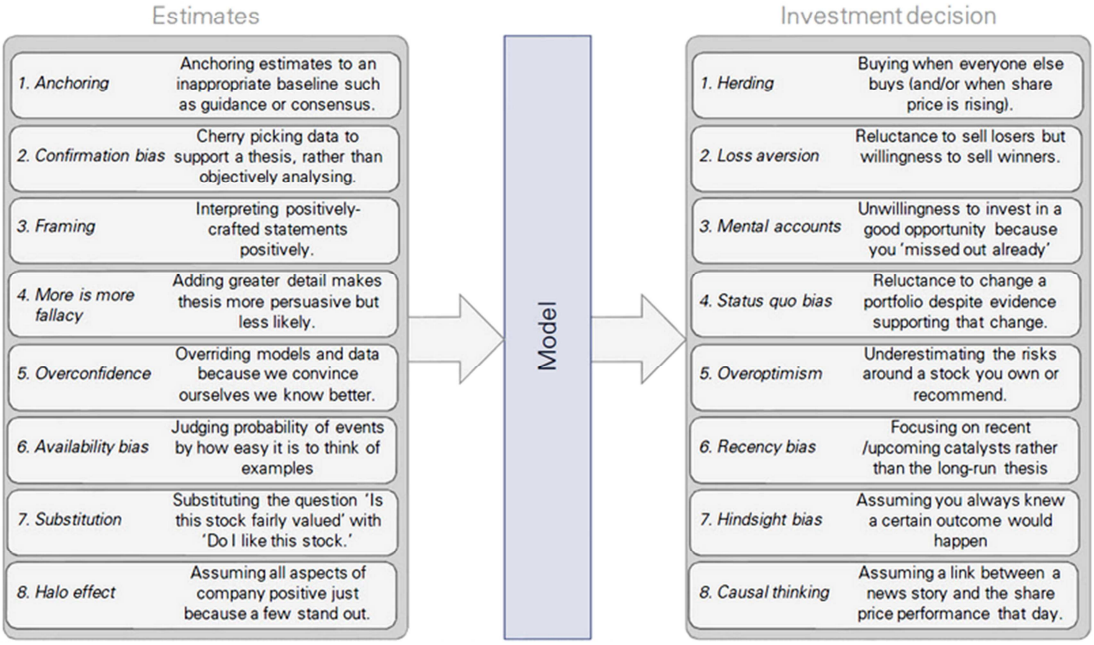
Adjusting to this modern necessity, the new attempts for theories, did not only try to explain consumption and savings but also to propose ways to overcome the existing heuristics. Individuals significantly differ in their planning abilities and choices in terms of loss aversion[4], framing effects[5], cognitive inertia[6], procrastination etc. (Mitchell and Utkus, n.d.). All the above heuristics, underline the fact that not all people share a common profile when it comes to economic behavior. Therefore, taking this polyphony under consideration before making policies, or even small range collaborations could be significantly efficient and helpful. Figure 2 demonstrates some of the most common behavioral biases.

[4] **Loss Aversion:** the loss of utility associated with giving up a valued good is greater than the utility gain associated with receiving it (Tversky and Kahneman, 1991)

[5] **Framing effects:** observed when the description of options in terms of gains (positive frame) rather than losses (negative frame) elicits systematically different choices (Gonzalez et al., 2005). It can also have other effects, for example in the way a question is framed that can result a certain answer.

[6] **Cognitive Inertia:** (or the status quo bias) people are reluctant to make decisions for change because they focus on what they could lose than in what they might gain (Samuelson and Zeckhauser, 1988)

Figure 2: Behavioral Biases, (Durden, 2013)



Source: businessinsider.com.au, 2013

Many researchers find it crucial to build up their theories on a fundamental assumption that "People or pension holders do not behave actively" (Mitchell and Utkus, n.d.) as it is clearly implied by taking a closer look at all the human heuristics and biases. Another reason which supports the behavioral element in economics is the recent move from "Defined–Benefits"[7] to "Defined–Contribution"[8] pension schemes (Thaler and Benartzi, 2004). Due to the global financial crisis of 2008, pension schemes had to limit their frames in terms of benefit entitlement and transferred a significant decision weight to the employees regarding maintaining a sustainable financial future.

As a matter of fact, it is important for people to raise their awareness over monetary planning and allocation because a relaxed retirement age seems to be no longer guaranteed. This newly formed and established reality gave birth to Save More Tomorrow theory (SMarT). Thaler and Benartzi (2004) introduced a new compensation plan design that helps employees increase their savings over time, while overcoming basic behavioral elements that hold them back from doing so. The plan proposes that the firms will provide their employees with small raises on their salaries every 6 months. The employees are aware of the exact amount of the raises as well as the timetable of the implementation of the policy. They have been asked beforehand to pre-commit to save some amount every 6 months and

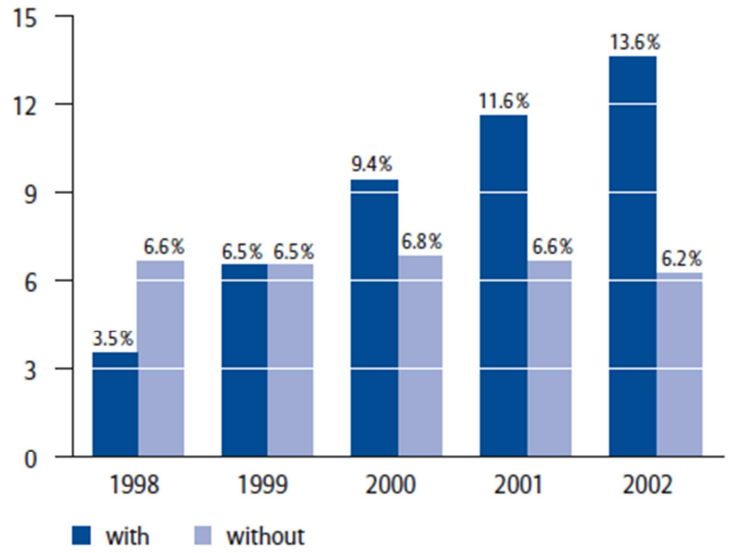
[7] **Defined-Benefits:** the employee's pension benefit entitlement is determined by a formula which takes into account years of service for the employer, and in most cases, wages or salary (Bodie at al., 1988)

[8] **Defined-Contribution:** the employee's benefit levels of the pension depend on the accumulation of contributions and investment earnings of the contribution both employers and employees make (Bodie at al., 1988)

they are free to opt out anytime. The key in SMarT is that employees pre-commit themselves to automatically increase their savings each time they get a raise (Benartzi, 2013).

The SMarT plan was originally implemented in 3 different companies in terms of size and its effect was impressive. As shown in Figure 3, saving rates increased from 3,5% to 13,6% over 3,5 years (Benartzi, 2013).

Figure 3: Save More Tomorrow, Thaler & Benartzi (2004)



Source: Benartzi (2013), Behavioral Finance and Post-Retirement Crisis

The simplicity of the program design is one of its main strengths (Thaler and Benartzi, 2004), but according to the authors the most vital element is the timetable of saving. Procrastination, Mental Accounting and Loss-aversion all together form the notion that "Saving in the future is more attractive compared to saving now". Thaler and Benartzi overcome this issue with the strategy of continuously increasing salaries in order to encourage people to save more in short-time. In other words, they proposed a "Ulysses strategy" (Benartzi, 2011) where companies, under the desire of their employees, need to clog ears to the Sirens/biases in order to achieve sustainable financing of their needs during their lifetime journey.

Apart from the effect on savings, though, SMarT is strongly connected to the way people perceive utility. Kahneman and Tversky (1979) argued that people tend to team up and compare monetary budgets, in other words, "gains and losses can be coded relative to an expectation or aspiration level" (Kahneman and Tversky, 1979). So a potential withdrawal from a future gain may be interpreted as an overall smaller gain rather than a loss. Now consider the following example: a person that has just gained 1000, faces a choice of a

certain loss of 100 or the chance to lose 200 or lose nothing with equal probability. If they have already adjusted to the former gain they will probably interpret this choice as -100 for sure or -200 with 50% chance and 0 otherwise. If they have not perceived the initial 1000 as theirs already, they will probably interpret the choice as 900 for sure or 800 with 50% chance and 1000 otherwise. It is all a matter of reference point set. The only difference is that if we consider this example as potentially buying insurance, the latter representation will make it more likely for the individual to actually buy it (Kahneman and Tversky, 1979). This is exactly what SMarT tries to do: translate small future losses as not moderate future gains. If a proper framing is used to describe the aforementioned in an attractive way it will probably make it or likely to people to see SMarT in a positive way and decide to enroll.

The SMarT plan offered an interesting insight back in 2004 and since then it is gradually becoming more and more popular. "The Profit Council of America reports that as of 2007, 39% of large employers in the US have adopted some type of automatic escalation plan" (Thaler and Sustein, 2008). Moreover, the program was part of the Pension Protection Act in 2006 in the US (Benartzi, 2013).

Even though, SMarT seems to have opened a new door to modern behavioral pension schemes, there are a few disadvantages observed as the plan was implemented in different ways. Participants are usually not fully aware of the benefits of such a program and they do not always act consciously (Benartzi, 2011). So far there was not a default way of implementation of SMarT and the program should get enriched with a closer look to the demographics the calculations are based on (Thaler and Benartzi, 2004). Lastly, there is also a strong debate regarding automatic enrolment to such programs, a concept strongly supported by the fathers of SMarT.

According to Thaler and Sustein, automatic enrolment has proven a valuable tool since it helps raising employees' opt-in levels up to 98% (Thaler and Sustein, 2008). So instead of asking people to register to a default compensation/financial plan, why don't we register them automatically, while offering them the option to opt-out anytime they want? The opposing side of the debate argues that every choice a human makes should be made consciously and rationally and automatic enrolment might conflict that (Lusardi et al., 2009). Since automatic enrolment goes a lot beyond financial decision, for example organ donation[9], it is indeed difficult to strongly stand behind one opinion.

[9] There is an upcoming trend that supports the implementation of automatic enrolment in organ donation. That means that all adults would automatically be registered as organ donors with the option to opt out anytime they want (Behaviouralinsights.co.uk, 2015)

As this debate goes on, it keenly leaves room for discussion about the technique of Nudging, the practice to alter peoples' behavior in an indirect way. A way that aims to diminish the great willpower we need to act rationally.

Nudging

Daniel Kahneman argues that the human mind thinks using 2 systems: the Automatic system for the on-the-spot thinking and the Reflective system for deliberate judgment (Kahneman, 2011). This theory is in line with many of the aforementioned arguments regarding how rational people decide and act. But how can we deal with the conflict of our 2 systems, when snap judgment conflicts with thorough thinking?

What Thaler and Benartzi do in their SMarT plan is Nudging: "an aspect of choice architecture that alters peoples' behavior in a predictable way without forbidding any option or significantly changing their economic consequences" (Ly et al., 2013). This popular technique, with many practical applications already[10], has raised a big debate concerning the morality of the nudging practices. In other words, the so called "choice architecture", or the way in which decisions are affected by how choices are demonstrated (Thaler and Sustein, 2008). A few researchers argue that some early nudges have gone wrong because the many different effects a nudge can have depend on the characteristics of the decision maker and can not be known in advance (Johnson et al., 2012).

Richard Thaler, the father of Nudging, introduced the concept of Libertarian Paternalism to support the legitimacy of his theory. The term enclosed two different meanings: "people should be free to do what they like […], and the claim that it is legitimate for choice architects to try to influence people's behavior in order to make their lives longer, healthier, and better" (Thaler and Sustein, 2008).

It is true that it is difficult to come up with a conclusion about the rightness of nudging as many ethical questions are raised. Nevertheless, in real life there is no neutral architecture (Johnson et al., 2012). Whatever is said, discussed or presented is subject to the unique perspective and ethics of the introducer. So, if structuring and describing potential choices promise better decisions, healthier lives and improved finances we should logically anticipate that the majority of people will positively embrace such an initiative.

[10] See Appendix A

Methodology

Hypotheses

The three hypotheses of this thesis deal with the effect of compensation plans on employee's rational economic decisions. By rational I mean the economic behavior that leads to optimal economic choices in terms of getting in line to what Life – Cycle theory suggests.

As explained before, SMarT type of compensation plans aim to nudge people to be more consistent planners and organize their future today, avoiding behavioral biases that may hold them back from doing so. The notion of *myopic loss aversion* is highly connected to the rationale behind the following hypotheses, especially the first one. According to this behavioral notion, the less frequently a person evaluates their monetary choices the riskier they are (Thaler, 1999). Gneezy and Potters (1997) also demonstrated this causal relation of time and risk attitude which in the case of SMarT should hold the following way: The frequent timetable of decisions every 6 months in SMarT should be expected to come with more risk averse profiles.

Taking the aforementioned notion one step further, I assume that a few behavioral attitudes may change under such a compensation plan towards a more rational decision making. Hypotheses 1 and 2 imply that certain employees will behave more rationally in terms of risk and patience. To be more precise:

H1: Employees under a SMarT type of compensation plan (or hybrid) have higher chances to be **risk averse** than employees not under such a program

H2: Employees under a SMarT type of compensation plan (or hybrid) have higher chances to show more patience (**lower discount factor**) than employees not under such a program

Hypothesis 3 sums the previous two, as more risk aversion and more patience are usually indicators of rational economic behavior (Thaler and Shefrin, 1981), suggesting that certain employees will also differ in terms of saving rate.

H3: Employees under a SMarT type of compensation plan (or hybrid) show **higher saving rate** than employees not under such a program

The hypotheses state that the employees who receive a floating salary, close to what SMarT suggests, will differ from those ones that receive a fixed salary in terms of risk attitude, discounting profile and saving rate.

Research Methodology

Due to companies' low willingness to provide data of their actual employees, I moved on to a plan B and created an online survey in order to test the three hypotheses (Appendix B). The survey demonstrated one out of two different working scenarios, in a random way, and participants asked to fill it. Each scenario described either a SMarT type of floating salary or a fixed type one (Appendix B). It is interesting to mention that even though the two scenarios offer different salaries and contract options, they both yield approximately the same (~77.000€) total earnings at the end of the 5-year contract suggested (Appendix C).

The main body of the survey that followed was the same for both working scenarios. Firstly, a few general demographic questions were asked. Then, a short reminder of the scenario was shown to make the desired working situation more vivid to individuals. After that, fifteen questions followed in order to measure the three different elements of my hypotheses. The survey was constructed with two short descriptive texts and not many questions, aiming to keep it brief and not to put off respondents.

The first 5 questions were used for categorizing individuals in terms of risk attitude and were chosen by previews studies on Risk profiling by "The Pension Authority" (The Pensions Board, 2015) and "Oxford Risk rating" (Oxford Risk, 2015). Each of the answers (Fully Agree to Fully Disagree) gets a weighting point; the sum of each participant's score varies from 5 to 22, implying that the higher the sum the more of a risk seeker the individual should be.

The next 5 questions were used to measure discounting. I used the typical form of questions of 2 different choices (A or B) given in two different periods of time. The questions were chosen by a survey concept used by Kirby, Petri and Bickel in their paper in 1999 to measure discounting among heroin addicts (Kirby et al., 1999). According to their method, a k value of indifference is estimated based on the answers an individual gives, which underlines their discounting level. I intentionally used two questions of the same implying indifference value in order to check answers for inconsistency. Here is how the aforementioned method works for the survey used in this thesis:

- In the first question k=15.5% for indifference.
- In the second question also k=15,5%
- In the third question k=6,45%
- In the fourth question k=1,2%
- In the fourth question k=0,5%

All the above percentages should correspond to daily discounting (Kirby et al., 1999).

The questions are presented in a diminishing pattern regarding the indifference percentage. That means that if an individual changes their answer at some point (from A to B or vice versa) we are able to check their discount factor interval. If for instance an individual chooses B in the first three questions and then switches to A, then we know that 6,45 < *discount factor* < 1,2 holds for them. For the case of inconsistent answering, that is a double switch of preference over A and B, I focused on the "proportion of a person's consistent answers to the assignment" (Kirby et al., 1999) in order to estimate a k interval. It is interesting to mention that only 10% of the participants provided inconsistent answers in the part of discounting. For the sake of categorizing individuals into groups, I created 5 different categories each corresponding to every k interval possible. More precisely, group 0 contains those that recorded a k ≤0,5%, group 1 those with 0,5% < k ≤ 1,2%, group 2 those with 1,2% < k ≤ 6,45%, group 3 those with 6,45% < k ≤ 15,5% and group 4 the individuals that recorded a k discount rate above 15,5%.

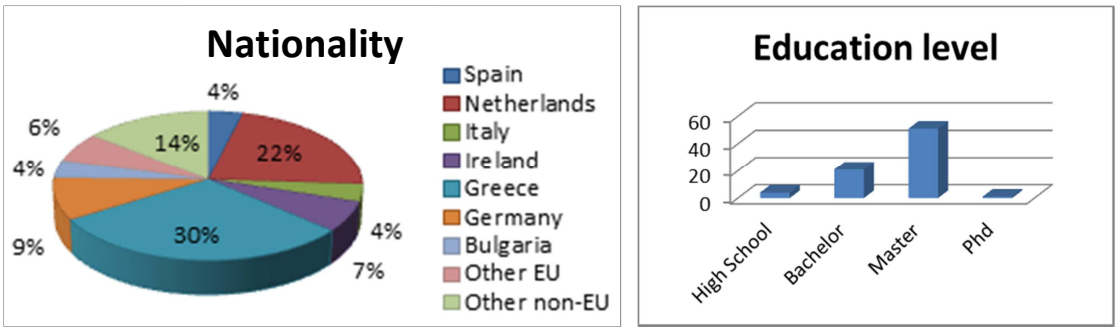
At the last part of the survey, 5 questions were also used to measure saving rate. Individuals were asked what they would do with an amount of money additional to their salary. They could choose to "Spend it all", "Save or Invest it all" or "Save just a part of it". The first amount, demonstrated was 100€ and the last 500€. This increasing order helps to expose any potential differentiation in terms of spending or investing regarding the amount of money offered. In the one last question, participants were asked to write down the "optimum saving percentage" according to their opinion and whether it is easy to achieve it or not. The representative number regarding the saving rate of each individual came as a result of the average of the answers in the aforementioned questions of the survey.

Data Collection

The form of the, previously described, questionnaire was published and stayed online from 23/03/2015 to 18/05/2015, using Google Qualtrics.

The survey was distributed to personal friends and classmates trying to maintain a diversified sample in terms of nationality, age, gender and working experience. Those are the main reasons why I did not pursue a sample strictly consisting of students. In other words there was not any sort of blocking in sample's characteristics. The following figures demonstrate the sample distribution in terms of nationality and education.

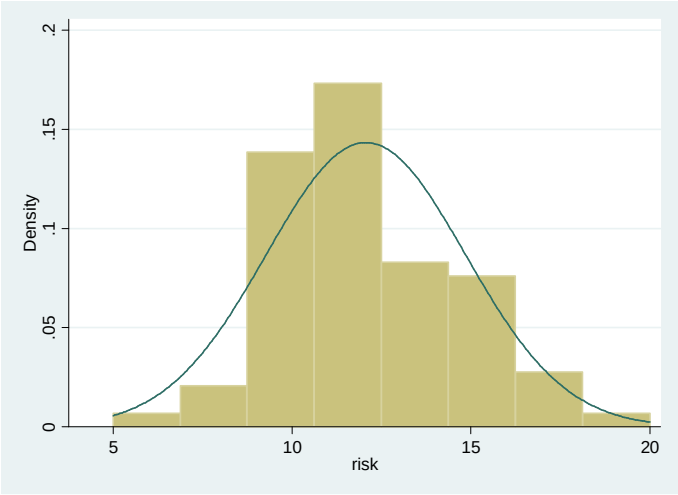
Figure 4: Diversification of participants' nationality and educational level



Surveys that were incomplete were not included in the final sample. Moreover, participants that had a working experience of less than a year we also not included. Thus the final sample was n=77.

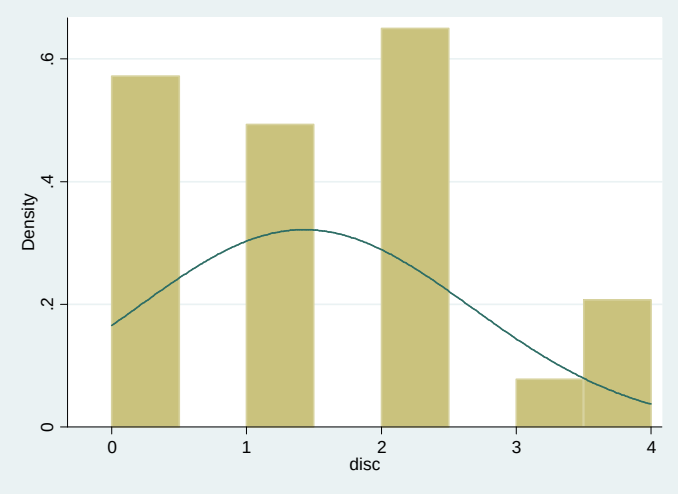
Concerning the 3 dependent variables, risk attitude, discount rate and saving rate the results are demonstrated in the graphs that follow.

Graph 1: Distribution of the variable risk (risk attitude)



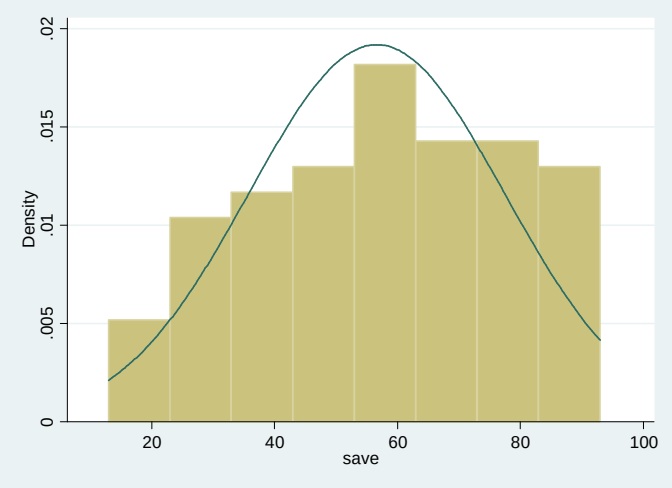
The distribution of the scores that show us the risk attitude of the individuals seems to be close to normal with a slight skewness to the right. The average of this series of data was 12.1 and the standard deviation 2.78. Even though, there is no generic number to describe the percentages of risk averse and risk seeking people in society, experiments have shown that risk aversion is slightly more often encountered in real life (Holt and Laury, 2002). Based on this, my observations seem to be in line with what literature suggests.

Graph 2: Distribution of the variable disc (discounting/impatience)



Regarding the distribution of the groups that underline the discount rate of the participants in my study, it does not seem to be close to normal with a clear right skewness. The most often encountered group was 2 (1,2% < k ≤ 6,45%) with 25 observations and the least often one was 3 (6,45% < k ≤ 15,5%) with 3 observations. In this case, once again, we do not find a specific range of discount rate that is generally accepted in literature, since the measurement of discounting usually results a "noisy" instrument of attitude. Nevertheless, experiments show a small "behavioral disposition towards impatience" (Chabris et al., 2008). It seems that the results are again close to what literature suggests.

Graph 3: Distribution of the variable save (saving rate)



As for what it has to do with the observed saving rate, again the distribution of the observations is not normal with a clear left skewness this time. This average number for my sample's optimum saving rate was 56% with a standard deviation of 20.8. Olivier Blanchard, argues that the there is a Golden Rule in terms of optimum saving rate. Such a rate which

could ensure that an economy maintains at a steady state[11] is 50% (Blanchard, 2006). My results here deviate a bit from what literature describes.

Overall, the results of the online survey were not totally in line with what is suggested in academic literature.

At this point, it is important to mention that no power calculation was conducted before the survey went online in order to set the goal of sample size for the groups of fixed and SMarT type plans. After the end of the questionnaire distribution, though, I calculated the relative sample sizes needed based on the following formula of List (List, Sadoff and Wagner, 2011):

$$\frac{n0}{n1} = \frac{\sigma 0}{\sigma 1}\sqrt{\frac{p1}{p0}}$$

In the above formula n_0 and n_1 refer to the amount of observations in group 0 (SMarT) and group 1 (Fixed) respectively. The symbols of σ_0 and σ_1 correspond to the standard deviation of each group and p_0, p_1 to the price/reward offered to either SMarT and Fixed group. I calculated the standard deviation for each of the two groups, regarding my second continuous dependent variable (saving rate), ending up with 20,33 for fixed type and 21,19 for SMarT. Since, two discount vouchers were offered as a reward, one for each group, I consider the fraction of prices equal to 1. Thus n_0 (SMarT) should be equal to 20,33/21,19 = 0,96 * n_1 (Fixed). In truth, the numbers seem to be good, since the observations for SmarT were 37 while for fixed 40 (37/40 = 0,93 ~ 0,96). Taking under consideration the fact that each group has at least 30 observations, the generally accepted rule of thumb in statistics, I believe that my sample serves the basic suggestions of power calculation.

Data analysis

For the analysis of the data I used the econometric package Stata. As a first step I checked the distribution of the independent variables, in order to conclude on the predictive strength of my sample. The variables used are demonstrated below:

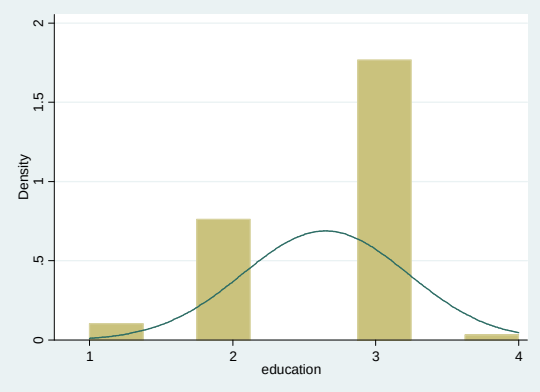
[11] **Steady state:** the state in which output per worker and capital per worker are no longer changing. In other words, consumption is equal to what is left after enough is put aside to maintain a constant level of capital (Blanchard, 2006)

Table 1: Names and types of the variables

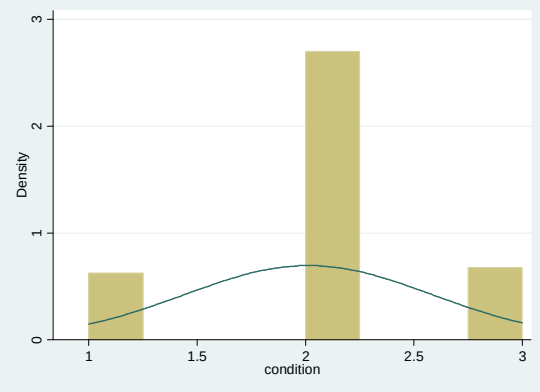
Dependency	Variable	Type
Dependent	**risk**	continuous
Dependent	**disc**	ordinal (0=most patient to 4=most impatient)
Dependent	**save**	continuous
Independent	age	continuous
Independent	male	binary (male=1)
Independent	education	ordinal (high school=1, bachelor=2, master=3, Phd=4)
Independent	experience	continuous
Independent	smart	binary (smart=1)
Independent	condition	ordinal (bad=1, ordinary=2, good=3)

As shown in the following graphs, variables education and (perceived financial) condition (Graph 4) are somehow close to normal distribution, while on the other hand variables age and experience (Graph 5) are not, with both having a strong right skewness. Below each graph the average and standard deviation are shown for continuous variables; highest and lowest encountered groups of variables are demonstrated for ordinal variables, with the actual number in parenthesis.

Graph 4: Distribution of the variables: education and condition

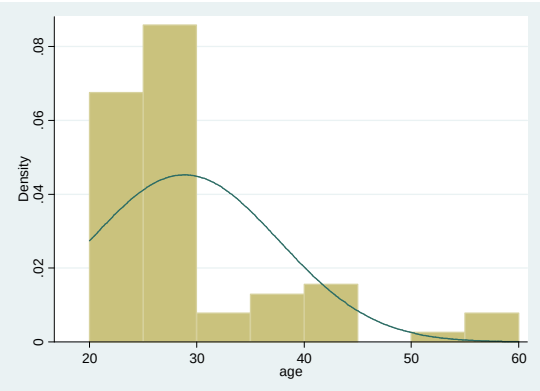


Most frequent: 3 (51), Less frequent: 4 (1)

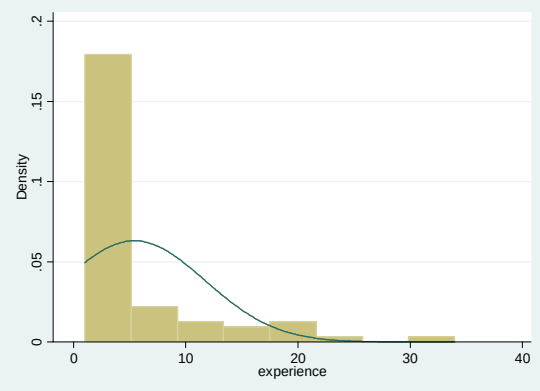


Most frequent: 2 (52), Less frequent: 1 (12)

Graph 5: Distribution of the variables: age and experience



Average: 28.9, Standard deviation: 8.8



Average: 5.4, Standard deviation: 6.3

In order to overcome such normality inconvenience of variables, it sometimes the case to generate a new variable by taking the natural logarithm of a variable with no balanced skeweness. This technique is usually preferred when "a change in the dependent variable is related with percentage change in an independent variable, or vice versa" (Dss.princeton.edu, 2015), which is not the case for all the hypotheses in our situation. That is why I chose to move forward with the original variables.

Gender and compensation plan distributions were well balanced with 38 males - 39 females and 37 Smart – 40 fixed type, respectively.

Regression analysis for H1

To test my first hypothesis, concerning the relation of risk attitude and compensation plans, I ran an OLS regression model. That is because the dependent variable in this case is continuous. In all the econometric models that follow I also use age, gender, education, years of experience and financial condition as independent variables.

The following table shows the simple OLS model for testing hypothesis 1:

Table 2: OLS regression model for risk attitude

	risk
age	0.091
	(0.074)
male	0.907
	(0.643)
experience	-0.225**
	(0.105)
education	-1.442**
	(0.573)
smart	-0.152
	(0.625)
condition	0.725
	(0.546)
Constant	12.641***
	(2.303)
Observations	77

Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01

Before moving forward to interpreting the results, we should check the model for heteroscedasticity. Table 3, as demonstrated in Sata, shows the outcome of such a test:

Table 3: Heteroskedasticity test for OLS model for risk attitude

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of risk

         chi2(1)      =     2.03
         Prob > chi2  =   0.1538
```

Based on the above results, the null hypothesis $H_{0,}$ that there is **homoscedasticity,** can not be rejected. For this reason, there is no need to run the OLS model again and robust the observations.

As shown in Table 2, age, male and (financial) condition have a positive effect on the score that categorizes an individual according to their risk attitude, ceteris paribus. On the other hand, experience, education and being under a SMarT type of compensation plan have a negative effect on riskiness, ceteris paribus**.**

Moving forward to check the variables in terms of statistical significance, only education and experience are significant at a 5% significance level. The other 4 variables, including smart, are insignificant even at a 10% significance level. For this reason we can not extract any safe conclusion regarding the causal relation between the type of compensation plan and risk attitude.

Concerning the goodness of fit for my OLS regression model I shall use the F-test. The value of F was demonstrated in the original regression table of Stata and it was 2.21. For the case of the F-test, its bigger the value the better. In our case a value of 2.21 is considered as extremely low. This means that the explanatory power of my model in not good at all.

As a matter of fact, **hypothesis 1 should be turned down** due to low statistical significance of the variable smart and low explanatory power of the regression model. Even though there is indeed a negative relation between variables smart and risk, we can not safely extract any valid conclusion.

Regression analysis for H2

To test my second hypothesis, concerning the relation of discounting rate and compensation plans, I use an ordered probit model. I do so because the dependent variable in this case is an ordinal one.

The following table shows the ordered probit model for testing hypothesis 2:

Table 4: Ordered probit model for discounting

	disc
age	0.027
	(0.030)
male	0.091
	(0.262)
experience	-0.046
	(0.044)
education	-0.354
	(0.235)
smart	-0.061
	(0.254)
condition	-0.495**
	(0.226)
cut1	
Constant	-1.977**
	(0.947)
cut2	
Constant	-1.277
	(0.939)
cut3	
Constant	-0.237
	(0.930)
cut4	
Constant	-0.045
	(0.931)
Observations	77

Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01

As shown in Table 4, age and male have a negative effect on the probability an individual is within the lowest group of discount factor, ceteris paribus. That is why the coefficients of age and male are of the opposite sign of cut1. On the other hand, experience, education, financial condition and smart have a positive effect on the probability someone is among the most patient group of participants, ceteris paribus.

Moving forward to check the variables in terms of statistical significance, only (financial) condition is significant at a 5% significance level. The rest 5 variables, including smart, are insignificant even at a 10% significance level. . For this reason we can not extract any safe conclusion regarding the causal relation between the type of compensation plan and discounting.

The next table shows the average marginal effects of independent variables on the dependent for the ordered probit model of discounting:

Table 5: Average marginal effects on discounting

```
. margins, dydx(*) predict(outcome(0))

Average marginal effects                        Number of obs   =         77
Model VCE    : OIM

Expression   : Pr(disc==0), predict(outcome(0))
dy/dx w.r.t. : age male experience education smart condition
```

	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
age	-.0087445	.009454	-0.92	0.355	-.027274	.0097851
male	-.0290816	.0840513	-0.35	0.729	-.1938191	.1356559
experience	.0146086	.0139728	1.05	0.296	-.0127776	.0419948
education	.113421	.0737562	1.54	0.124	-.0311385	.2579805
smart	.0197223	.0814071	0.24	0.809	-.1398326	.1792773
condition	.1588552	.069742	2.28	0.023	.0221633	.2955471

Here we see that age has a negative marginal effect on the propensity someone has a discounting rate smaller than 0.5 (the most patient of the groups). Male also has a negative effect, slightly stronger. On the contrary, variables experience, education, condition and smart have a positive marginal effect on the chance an individual is patient**.**

In this case, only (financial) condition is significant in a 10% significance level. All the other 5 variables, including smart are statistically insignificant even at a 10% significance level so we can not extract any safe conclusion.

As a matter of fact, **hypothesis 2 should be turned down** due to low statistical significance of the variable smart. Even though there is indeed a positive average relation between smart and patience, we can not safely extract any valid conclusion.

Regression analysis for H3

To test my third hypothesis, concerning the relation of saving rate and compensation plans, I use an OLS regression model.

The following table shows the simple OLS model for testing hypothesis 3:

Table 6: OLS model for saving rate

	save
age	-1.066*
	(0.570)
male	1.380
	(4.986)
experience	1.612*
	(0.815)
education	-0.109
	(4.444)
smart	6.479
	(4.850)
condition	-5.352
	(4.233)
Constant	85.920***
	(17.855)
Observations	77

Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01

Before moving forward to interpreting the results, we should check the model for heteroscedasticity. Table 7, as demonstrated in Sata, shows the outcome of such a test:

Table 7: Heteroskedasticity test for OLS model for saving rate

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of save

         chi2(1)      =     0.21
         Prob > chi2  =   0.6443
```

Based on the above results, the null hypothesis H_0, that there is **homoscedasticity,** could not be rejected. For this reason, there is no need to run the OLS model again and robust the observations.

So, as shown in Table 6, male, experience and smart have a positive effect on the saving rate of employees, ceteris paribus. On the other hand, age, education and (financial) condition have a negative effect on the saving rate of an individual, ceteris paribus.

Moving forward to check the variables in terms of statistical significance, only experience and age are significant at a 10% significance level. The other 4 variables, including smart, are insignificant even at a 10% significance level. For this reason we can not

extract any safe conclusion regarding the causal relation between the types of compensation plan and saving rate.

Concerning the goodness of fit for my OLS regression model I shall use the F-test. The value of F was demonstrated in the original regression table of Stata and it was 1.21. A value of 1.21 is considered as extremely low. This means that the explanatory power of my model in not good at all.

As a matter of fact, **hypothesis 3 should be turned down** due to low statistical significance of the variable smart and low explanatory power of the model. Even though there is indeed a positive relation between variables smart and saving rate, we can not safely extract any valid conclusion.

Limitations

Sampling restrictions

Even though, the sample was well diversified in terms of nationality, gender, educational level and type of compensation plan it still suffers in terms of size. The original goal was 80 observations and the usable ones managed to get really close to this number. In any case, a bigger sample would probably have had positive effects, especially regarding the normality of variables' distribution.

Information Contagion

As previously mentioned, I mainly approached personal contacts to distribute the questionnaire. Unfortunately, this increases the possibility that participants would discuss the details of the questionnaire prior to responding and answers may have been biased. I did not want this to affect the outcome of our study and decided to close the questionnaire earlier than I could.

Other variables as indicators

In the survey, a few questions were initially asked concerning participants demographics to create the future independent variables which would be used in the regression analysis. The attempt was to use only a few variables and questions for the sake of the survey's simplicity.

Nevertheless, some factors such as the salary range of the employees may have been neglected.

Categorization of Observations

For the sake of comparison between groups, I needed to categorize the observations into groups in my second hypothesis. This decision has obviously an effect in terms of neglected categories and phenomena. For instance, effects like “hyperbolic discounting” could not be observed and used later in the analysis.

Questions on profile measurement

As it was often underlined before, the goal was to keep the online survey as short and simple as possible. For this reason only a limited amount of questions was used for measuring the profile of the participants concerning risk attitude, discounting and saving rate. Thus, there is a chance that the profiling outcomes as resulted by the answers of the questionnaire are not very accurate, or even wide intervals are used to maintain an attribute. For instance, Kirby et al. used 27 different questions in their paper to measure discounting. I tried to pick 5 representative and easily understandable ones to use in the survey. This might came with the disadvantage of neglecting some of the 9 different categories of indifference used in the aforementioned paper.

Conclusion

In conclusion, all the three hypotheses, concerning the relation of compensation plans with risk attitude, discounting rate and saving rate were not confirmed. For the study I conducted, I am not able to determine that a SMarT type of compensation scheme can lead to less risk taking, higher patience and higher saving rates. Nevertheless, in all three hypotheses, the forecasted relation between the variable that represented SMarT and the dependent variable at each case was actually confirmed by the econometric models. The low levels of significance, though, offered no other option but to turn down the causal relations proposed.

In my opinion, there was indeed some indication that the hypotheses proposed were on the right track, but of course indication is something different that proof. For instance, normally distributed variables such as the financial condition and education performed well in terms of significance in the analysis. That put me into thought as I feel that a better constructed sample and a more thorough survey in terms of questions used, may possibly correct the anomalies of the analysis.

In this last table, below, I demonstrate in brief the basic conclusions of my study:

Table 8: Data analysis overview

Hypotheses	Relation	Model	Explanatory power
H1: SMarT and Risk loving	negative	OLS	Not good
H2: SMarT and Imatience	negative	Oprobit	Medium
H3: SMarT and Saving rate	positive	OLS	Not good

Recommendations

My findings could possibly serve as input of some future studies, investigating the extent of significance in the causal relationship of compensation plans and economic behavior. If such a connection actually exists, further research on it could become an extremely valuable tool for national economies worldwide.

In an ideal world, I would repeat this survey correcting its main limitations. The most important element that needed to be different, in my opinion, is the nature of data. Working with primary data, collected from employees who are actually under either fixed or SMarT type of compensation plans, would make this survey more realistic. That way, participants would not have to imagine themselves in a particular working scenario but answers based on their formed experience. In addition, I would aim to include employees with a minimum of 3-5 years of working experience to further enhance the consistency of their answers. It would be also important to expand the number of questions used to measure each economic attribute. This would probably bring as a result more accurate scores of measurement. Lastly, I would aim for a bigger sample that could possibly correct all the anomalies observed in this survey in terms of variables' normality.

I truly believe in this research and I am dedicated to make the alterations needed to run it again, with the hope to end up with significant results. That is why I believe that a valid conclusion which connects compensation plans with economic behavior and choices could have an interesting effect on the way economic behavior is formed.

In an era where economic agents, from single employees to nations, struggle to converge to common financial practices to secure their economic power, new techniques that can promise a frugal, structured and safer future for everyone would be desirably welcome. If we can foresee and change the economic foundations of the next generations, which will eliminate the continuing financial conflicts of today, I see no reason not to work hard on doing so.

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Appendix

Appendix A

1. Examples of Nudging.

Taking under consideration human heuristic and biases, “Nudging” smoothly pushes people towards certain beneficial behaviors without eliciting any options. Here are a few examples of implementation of Nudging in real life.

A. “A Nudge to the Garbage Bin”: In 2012, in Copenhagen, local municipality along with Roskilde University came up with an externally imposed low cost action that mindlessly encouraged people to achieve self-control in terms of public littering (Ly et al., 2013). They placed sticks of footsteps on the ground, outside popular public spots, that led to garbage bins. People, unconsciously, followed the steps and used the bins. The results were surprising. 46% decrease of wrap littering within the first month and 26% overall by the thirds month of implementation (iNudgeyou, 2012).

B. “The Waterpebble”: The Waterpebble is a water conservation device that was designed by Paul Priestman . The device keeps track of the average water consumed during a shower and uses it as a benchmark for the future (Ly et al., 2013). It also uses a “traffic light” technique where the Waterpebble provides signs of green, yellow and red based on the remaining amount of water that is to be used. This initiative is considered as a self-imposed nudging action that mindlessly discourages individuals to create the unsustainable habit of consuming too much water (Waterpebbleus.com, 2015).

Appendix B

1. Working Scenarions

Working Scenario 1 – Fixed salary:

You have offered and signed a 5-year contract from PRW Intelligence, a company you really wanted to work for. Your salary will be compensated as follows:

Each month you will receive a net salary of 1500 € for an 8-hour shift per working day. Working overtime is compensated with 10 € / hour.

PRW Intelligence doesn't work with productivity/goal achievement bonuses so the above salary is considered fixed. Holidays are provided according to law guidelines.

Consider that this salary exceeds your monthly living costs.

Working Scenario 2 – Floating salary (SMarT):

You have offered and signed a 5-year contract from PRW Intelligence, a company you really wanted to work for. Your salary will be compensated as follows:

Each month you will receive a net salary of 1200 € for an 8-hour shift per working day. Every 6 months a 5% raise will be applied on top of your salary. Working overtime is compensated with 10 € / hour.

Holidays are provided according to law guidelines.

Consider that this salary exceeds your monthly living costs.

2. Survey Questions

- What is your age? _____
- What is your sex? *Male* *Female*
- Level of education. *High School* *Bachelor* *Master* *Phd*
- How many years have you been working for this company? _____
- How would you describe your current economic situation? *Bad* *Ordinary* *Good*

- People that know me well would describe me as a cautious person

  5 4 3 2 1

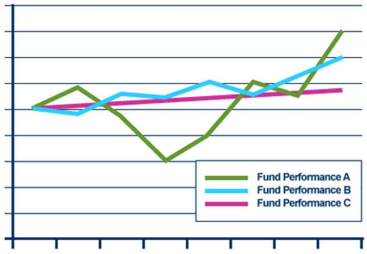
- I feel I am much more willing to take investments risks compared to others

  1 2 3 4 5

- I prefer the safety of keeping my money in the bank

  5 4 3 2 1

- Consider the following graph:



  Which invest would you choose to put your money in?

  *Option A **(3)*** *Option B **(2)*** *Option C **(1)***

- You are in a TV game show and you can choose one of the following. What would you choose?
  €1000 in cash ***(1)***
  €5000 with 50% probability ***(2)***
  €10000 with 25% probability ***(3)***
  €100000 with 5% probability ***(4)***

- Would you prefer A) €31 today or B) €85 in **7 days**? *A* *B* ***(15.5)***
- Would you prefer A) €11 today or B) €30 in **7 days**? *A* *B* ***(15.5)***
- Would you prefer A) €25 today or B) €60 in **14 days**? *A* *B* ***(6.45)***
- Would you prefer A) €34 today or B) €50 in **30 days**? *A* *B* ***(1.2)***
- Would you prefer A) € 40 today or B) €55 in **62 days**? *A* *B* ***(0.5)***

- Suppose you have in your possession €100 additional to your salary. What would you do with it?

  A) Spend €100 B) Save/Invest €100 C) Spend only some, how much?

- Suppose you have in your possession €200 additional to your salary. What would you do with it?

  A) Spend €200 B) Save/Invest €200 C) Spend only some, how much?

- Suppose you have in your possession €500 additional to your salary. What would you do with it?

  A) Spend €500 B) Save/Invest €500 C) Spend only some, how much?

- What do you think is the optimal percentage of saving/investing of your yearly salary? _____(%)
- Do you think this percentage is easy to achieve? *YES* *NO*

Appendix C

The salaries calculated in order to have the same Net Present Value considering a yearly interest rate of 6% (0,5% per month) additional to the above data. In other words both situations have the same "monetary impact" in present values.

A) 1500€, i=0,005/month, 60 months → 77700 € Net Present Value (NPV)

B) (NPV) 77700 €, i=0,005/month, 60 months, 5% raise/6 months → ~1200€