

Behavioral finance in Defined Contribution plans



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Abstract

There has been a shift from defined benefit (DB) pension plans to defined contribution (DC) pension plans in the United States in particular, though this trend is increasingly present in Europe including the Netherlands (Bateman et al. 2010). The risk of future pensions within DC plans lies with the employees, which significantly changes the pension system and future pension outcomes. Workers are responsible for their own contribution and portfolio allocation. It has become of more importance to study members behavior in pension planning and decision making. Research in behavioral finance can explain behavioral biases in this decision making process. Behavioral finance discovered anomalies which are phenomena that do not seem to fit within the rational expectations theory (Prast, 2003). This understanding could result in a better design of defined contribution plans in order to optimize the overall wealth of its members. This thesis will use behavioral biases in the saving process to find improvements for DC pension plans. Suggestions and improvements will be given to a new Dutch pension administrator Befrank.

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1 Introduction

Together, Dutch pension funds have the largest assets compared to GDP of all OECD countries. The ratio of total assets of Dutch pension funds and GDP was over 110, which gives you a sense of how large the Dutch pension market is. The accumulated assets of pensions funds were worth 684 billion Euros in the end of 2007 (OECD, 2010). The pension system of western countries has seen a change in the last few years, which drifted from defined benefit (DB) plans to defined contribution (DC) plans (Bateman et al. 2010). In DB plans future pensions are based on years of service and average wage, however in DC plans future pensions depend on the size and return on investment. The employee bears the full investment risk in DC plans and is responsible for his own portfolio allocation. In 2007, 96 percent of Dutch pension members were in a DB pension plan (Dalen et al. 2010). However the growth in DC plans for pension funds was 37 percent between 2006 and 2008 in the Netherlands (Befrank, 2010). The DC pension market is a potential growth market, in the United States this market is already matured. This thesis will use behavioral biases in the saving process to find improvements for the design of DC pension plans. Suggestions and improvements will be given to a new Dutch pension administrator Befrank. The question is: how could DC plans be designed in order to optimize its members' wealth considering their behavioral finance?

The pensions of members in DB plans are based on years of service and average wage. Both the employer and employee make a monthly contribution, which are collectively invested. Future pensions of members in DB plans are secured and pension funds and employers bear most of the investment risk, they are obliged to pay out premiums starting at retirement date. Dutch pension funds are obliged to have a minimum funding level of 105, which measures its assets compared to its future liabilities. When in times of crisis funding levels are below the minimum of 105, pension funds could lower contributions paid or increase premiums or raise retirement age: here lies the risk of the employee in DB plans. The financial crisis of 2008 put an immense pressure on pension funds and employers, since half of their members assets damped due to the decline in the stock market. Only between January and October 2008 pension funds worldwide lost almost 20 percent of total assets or 3.3 trillion dollars (Dalen et al. 2010). In DC plans future pensions depend on the size of and return on investment. Both the employer and employee contribute to the employee's account, however the employee is now responsible for his own contribution, it is not fixed nor is it mandatory in some countries like in the United States. The investment risk lies with the

employees and the outcome of future pensions greatly depends on employees' investment decisions. In DC plans workers are responsible for their own portfolio and investment allocation. One of the major issues concerning DC plans is that the majority of employees lack the knowledge or ability to make the right investment decisions. Clearly employers benefit of the shift towards DC pension plans, since they do not longer bear the investment risk and they are no longer responsible for the future pensions of their members (Antolin, 2009). For employees this shift can be profitable too, if pension funds and employers take the investment limitations of their members into account and help employees with investment decisions. Employees are able to choose their own risk profile, asset allocation and contribution in DC plans, which could be in their benefit since they have some freedom in investing and saving as they like. Pension funds and employers should design DC plans in a way that maximizes the wealth of their members, by helping employees to make the right investment decisions.

Traditional economic theory assumes all investors are rational. As a result games are fairly played and prices are correctly valued. A more recent approach to understanding investor behavior comes from behavioral finance, which discovered anomalies that are phenomena that do not seem to fit within the rational expectations theory (Prast, 2003). Behavioral finance assumes investors are not fully rational (Barbaris, 2003). Let's make this clear in a simple number game that the Financial Times organized in 1997:

A group of people can choose a number between 0 and 100. The person that chooses the number that is closest to three third of the average number chosen, wins. A rational player will choose 33, since it is three third of 50, the expected average number chosen. But given that all players are rational and they too will choose 33, you will be better of choosing three third of 33. But again, assuming that all players are rational they will do the same. Eventually a rational player will choose 1. However, the winning number of the Financial Times game was 13, suggesting that not every player is rational (Brouwer, 2001).

The size of the market and the change in the current pension system in the Netherlands makes it an interesting market to study. Since DC plans are already common in the United States, an important part of the literature comes from the US and will be used to study the DC market. In the Netherlands the number of defined contribution plans is fast growing and through a study of current DC plans offered in the United States, the Dutch pension market can learn from discovered errors and findings in the study of behavioral finance. Employees investing for their own account show behavioral biases and therefore have suboptimal pension outcomes

(Ritter, 2002). Even if employees do not invest themselves, research shows that the majority of employees choose a default plan, which is a pre-selected plan of a pension fund or employer with a given portfolio allocation and contribution rate. The default plan has therefore a significant influence on overall member wealth and it may not be the best options for everyone. Employers and fund managers have to be aware of the influence default plans have on overall wealth of their members (Byrne, 2007).

Research in behavioral finance has shown some behavioral biases in the saving process. This could lead to suboptimal pensions, hence an overall decline in wealth. People tend to be overconfident in their judgment and they tend to poorly estimate the probability of events (Barberis, 2003). Another discovered bias is loss aversion, which means that people put more weight on losses than on gains. This could consequently lead to holding on to losing stock instead of selling it. People also have the tendency to act the same, hence they show herd behavior (Johnsson, 2002). Behavioral biases will be discussed in section 3.2 and they will be applied to the saving process in section 3.3.

This thesis will use discovered behavioral biases to find improvements for DC plans, for the Dutch pension administrator Bepfrank in particular. There already exists a great amount of literature concerning behavioral finance and defined contribution plans, but this thesis will combine these two subjects. The question is: how could DC plans be designed in order to optimize its members' wealth considering their behavioral finance?

In section 2 I briefly review the Dutch pension system. The rest of the thesis could be roughly split up in three parts. In the first part I will look at the 'demand' side of the DC pension market: what biases do employees show in the saving process? I will try to explain errors made by employees in the saving process by using behavioral finance. In the second part I will look at the 'supply' side of the DC pension market: how are DC plans (mainly in the US) designed and what could be improved? In the third part I will use Bepfrank, a new pension administrator in the Netherlands, to find errors in the way they offer pensions and to make suggestions in order to improve them. First I will begin by introducing the subject pensions by briefly describing the Dutch pension system.

2 The pension system

Together, Dutch pension funds have the largest assets compared to GDP of all OECD countries. The ratio of total assets of Dutch pension funds and GDP was over 110, which

gives you a sense of how large the Dutch pension market is. The accumulated assets of pensions funds were worth 684 billion Euros in the end of 2007 (OECD, 2010). One of the largest pension funds on the world is the Dutch ABP, a pension fund for government employees, with 231 billion under asset (ABP, 2010).

2.1 Three pillar system

The Netherlands has a three pillar pension system with the first pillar containing the ‘*Algemene Ouderdomswet*’ (AOW) an allowance for people from the age of 65 to prevent poverty among elderly. This right is being owned by either living or working in the Netherlands between the age of 15 and 65. The AOW allowances are funded by taxes paid by the working population under the age of 65. The AOW premium is currently 17.9% of taxable income up to 32,127 Euros. The allowance depends on the minimum wage and is currently 710,50 Euros per month for married persons above the age of 65 and at most 1312,27 Euros for unmarried citizens above the age of 65 with children under the age of 18 (Rijksoverheid, 2011).

The second pillar exists for the working population, where part of salaries is saved during the years by both employers and employees. There are two different pension plans: a defined benefit (DB) and a defined contribution (DC) plan, which will be further discussed later. The DB pension plan market is larger, but the DC plan market is fast growing. The vast majority, more precisely 96 percent of Dutch employees, was in a DB pension plan in 2007. However the growth of DC plans for pension funds was 37 percent between 2006 and 2008 in the Netherlands (Befrank, 2010). In the United States the DC pension market has grown and become common, therefore in the Netherlands the DC pension market is a potential growth market.

The third pillar enables everyone to individually build up more future capital. Someone could hold a portfolio or buy real estate as a form of investment. Also, individuals have several ways to build up capital with insurers, like purchasing an annuity (Caminada, 2000).

2.2 Defined benefit vs. defined contribution plans

Within a DB plan the employee receives an allowance when retired based on salary and years of service. The replacement rate, the percentage of your wage being replaced by pension from the first and second pillar after retirement, is supposed to be around 70 percent of average wage earned during the years in DB plans. The monthly contribution of employer and employee is fixed and the employer bears most of the investment risk. Pension funds collectively invest the premiums set aside by employers and employees and are obliged to pay

out premiums to their members from retirement date on. However, if investments are poor and funding levels are below the minimum of 105, pension funds could have to lower premiums paid or raise contribution forced by the law (OECD, 2010). This is the risk the employee bears in DB plans.

Within a DC plan pensions are not based on salary and years of service, but pensions are based on contributions made to the employee's account and return on investment. The employee has an account to which he or she contributes a desired amount and to which the employer contributes a fixed premium. Pension funds collectively invest premiums paid by employers and employees and there is no agreed upon pension outcome. Now the employee bears the full investment risk and is responsible for his own portfolio allocation. The worker has several investment options it can choose offered by a pension fund, depending on how risk averse the investor is. Participation in the second pillar is large in the Netherlands, because employees are automatically enrolled in pension plans, which is not common in the United States.

2.3 The impact of the financial crisis

The financial crisis of 2008 had a great impact on the pension market. The AEX index reached a historical low of 199 points in the beginning of 2009. Pension funds had invested a great part of their customer's money in stock and as a consequence 80 percent of Dutch pension funds lost half their assets during the financial crisis (Burtless, 2009). Most of the Dutch pension plans were DB plans and therefore pension funds were still required to pay out the agreed upon premiums to their customers. Their funding levels, which measures their assets relative to their future liabilities, came under pressure as their assets had significantly decreased. The average funding ratio of Dutch pension funds was 144% in 2007, before the crisis, and it has decreased to an average of 92% in one and a half year (OECD, 2010). When funding levels, thus the ratio of assets and liabilities, are below 105 pension funds have to take action in order to increase their funding level. During the crisis interest rates dropped and the net present value of liabilities is calculated with the current interest rate: as a result the net present value of liabilities significantly increased which reinforced the decrease in funding levels. In the second half of 2008 the 15-year interest rate declined with 0.4 percent point and consequently increased future liabilities with 15 billion Euros in the Netherlands (OECD, 2010). Pension funds were apparently sensitive to market performance.

As stated before the pension system in the Netherland is experiencing a shift from DB plans towards DC plans. In 2007, 96 percent of Dutch pension plans were DB plans (Dalen, 2010).

However the growth in DC plans was 37% in pension funds between 2006 and 2008 and 45% for insurers between 2002 and 2005 (Befrank, 2010). Now you have an understanding of the Dutch pension system, we will turn to the behavioral biases employees show when making investment decisions. Behavioral finance can give a better understanding of how employees make decisions and of the errors they make in investing and saving. Behavioral finance discovered several behavioral biases that influence decision making and these biases are interesting to study since employees are becoming more responsible for their own future pension in the DC pension market. We will now show and discuss the obstacles for and behavioral biases of employees participating in DC plans.

3 Behavioral finance

3.1 Introduction

Traditional economic theory, like the widely accepted Efficient Market Hypothesis, assumes everyone to be rational. Within traditional models, decisions are consistent with optimal behavior and investors choose a strategy that maximizes their expected lifetime utility (Byrne, 2009). Rationality manifests itself in two ways: when new information is received by people, their beliefs are correctly updated and when decisions are made they are normatively acceptable, which means they are consistent with the Subjective Expected Utility (SEU). Behavioral finance is more recent approach to understanding financial markets and argues that some economic models are better understood assuming players are not fully rational. The study of behavioral finance discovered behavioral biases that arise when people form beliefs and make decisions (Barberis, 2003). These biases have an influence on the decision making process and therefore also on the saving process of employees. In the next paragraph I will briefly describe several behavioral biases discovered in behavioral finance. In paragraph 3.3 I will link these biases to the observed patterns in the decision making process of employees in DC plans.

3.2 Behavioral biases

The following behavioral biases are evidence of irrational behavior and these biases could influence employees' investment decisions. We will now briefly describe each behavioral bias.

Overconfidence & over and under reaction

People tend to be overconfident in their judgment and they can poorly estimate probabilities (Barberis, 2003). There exists an under reaction to news in general on short term, which is a period of one year, and there exists an overreaction to news on the long term, which is a period of 3 to 5 years (Barberis et al. 1988).

Optimism

People tend to overestimate themselves and their abilities. The majority thinks they are above average (Barberis, 2003).

Anchoring

Anchoring means that in estimating values, people anchor too much to a certain value instead of adjusting away from it (Barberis, 2003). People don't make rational estimates, since they are influenced by a certain initial value.

Conservatism

Conservatism means that people hold on to prior information and their prior beliefs, instead of adjusting their beliefs to new information (Barberis, 2003).

Loss aversion

Loss aversion means that people put more weight on losses than on gains. They are more sensitive to losses in their wealth than to increases. This often results for example in holding on to losing stock in the hope they will recover (Johnsson, 2002).

Mental accounting

Mental accounting means people put every event in a different account, although they may be connected with each other. This could lead to wrong decision-making (Johnsson, 2002).

Self control

People tend to have less self control than is assumed by most models. For example, they tend to overspend money (Johnsson, 2002).

Regret

People feel the pain of regret for making bad decisions and errors. This bias is closely related to the loss aversion bias. People tend to make decisions based on this possible pain of regret, which is in most cases not rational. For example, investors sell profitable stock because they fear it will drop in price and they will regret not selling it earlier (Johnsson, 2002).

Herd behavior

People often think the same and react to the same information, this could lead to herd behavior. The majority of people is sensitive to the judgment of others and they therefore change their own opinion. Word of mouth enhances herd behavior and bubbles and crashes

are strong forms of it (Johnsson, 2002).

Availability bias

When people estimate the probability of an event, they often seek their memory. This is a logical way of thinking, but it could lead to biased probabilities since not every memory is available. For example, recent events will be more available (Barberis, 2003).

Hyperbolic discounting

People tend to put more weight on rewards in the near future than in the far future. As a consequence the future is of little influence on decisions made now (Dicenzo, 2007).

Status quo bias

People tend to prefer the current situation above change.

In the next paragraph the behavioral biases described above will be linked to observed patterns in the saving process.

3.3 Patterns in the saving process

The study of behavioral finance in DC plans has for the greatest part taken place in the United States. With the growth in DC pension plans in the Netherlands it is important to understand employees' investment behavior and biases that have an influence on investment decisions. With this understanding pension funds could improve their DC plans and thereby increase their members' wealth. The study in behavioral finance shows that there exists a difference between how people should make decisions and how they actually make them, since behavioral biases have an effect on decision-making. Saving decisions are in practice often driven by these biases, which means that savings are not optimal (Byrne, 2009). I will now discuss the patterns of employees observed in the saving process and link them to behavioral biases.

3.3.1 Path of least resistance

Employees that are automatically enrolled in DC plans, tend to hold on to the automatically assigned pension plan for years and therefore they follow the path of least resistance. As a consequence their saving decisions are passive. This could be the result of the status quo bias, where people prefer the current situation above change. The annual 401(k) benchmarking survey of 2005/2006, reported that 79 percent of DC plan members choose an automatic enrolled plans, also called a default plan. This plan uses a 3 percent contribution rate and 76 percent of employees seem to hold on to it. Employees could consider default plans as advice, however in most cases a 3 percent contribution rate is not sufficient to build up

enough capital (Dicenzo, 2007). Between 48 and 81 percent of DC plan assets are invested in a default fund, typically a money market fund. Since the majority of DC plan participants stay in the default fund, they are of great influence on member wealth (Byrne, 2007). However, the use of default funds tends to decline with increase in income and job tenure (Byrne, 2009). The default plan could help overcome the self-control bias, since employees don't have to choose their own portfolio allocation and contribution rate. By choosing the default plan worker are not able to choose to not contribute to their account and spent their money now.

3.3.2 Lack of knowledge

When making investment choices traditional economic theory advocates that humans act rationally, but there are measurable limits to our rationality (Dicenzo, 2007). The average employee lacks the intelligence, knowledge, time and information to make optimal investment decisions. Even if they have the knowledge, they may find it unpleasant to make investment decisions (Bodie, 2007). To plan how much pension is needed and calculate which contribution rate would be appropriate seems to be difficult and goes beyond most rational abilities. As a consequence only 40 percent of employees calculate how much they should contribute for their pension monthly. Since people tend to overestimate their own abilities, which is called the optimism bias, they don't see the necessity of financial training. Due to the optimism bias, employees overestimate their qualities and abilities. It is therefore the more important pension funds offer financial information and training to their members.

3.3.3 Portfolio allocation

Findings in behavioral finance show that investors who have a choice among funds often use the $1/n$ rule for the allocation of their portfolio (Morrin, 2008). This means that money is being equally allocated to the number of investment options offered. In this case employees do not take their risk profile into account, since the more equity offered, the more there is invested in equity. Consequently the proportion equity here depends on the number of equity funds offered instead of risk aversion (Drieu, 2009). The $1/n$ rule exists due to lack of financial knowledge and due to overconfidence bias of employees. They truly believe they are well-diversifying their portfolio by the $1/n$ rule and they can poorly estimate the return on investment by doing that.

According to theory it is advised to rebalance portfolios at least once a year in order to remain the same risk profile. Ameriks and Zeldes (2004) research revealed that nearly half of DC members made no portfolio changes during ten years of study. A percentage of 87 made one or no changes during this period. Even if workers rebalance their portfolio's and invest

actively, portfolio turnover rates are one third the rate those of professional investors (Mitchell, 2006). Employees do not tend to rebalance at all, which is partly explained by the status quo bias and partly by lack of knowledge and the overconfidence bias. .

3.3.4 Overconfidence

The average employee tends to be overconfident when it comes to investing and this overconfidence increases as knowledge decreases. The 2006 Retirement Confidence survey reveals that 22 percent of employees who said to be very confident about their future pension, weren't saving at all and another 39 percent had saved less than 50,000 dollars (Dicenzo, 2007). Men are more likely to be overconfident than women (Ritter, 2003). Conventional financial theory says trade occurs when the marginal benefit of trade exceeds its marginal costs. This theory doesn't hold according to the overconfidence bias, since marginal benefits are exaggerated. A consequence of overconfidence is that non-traders can have a substantially greater return than active traders (Mitchell, 2006). The overconfidence bias could be reduced through financial education and training. By giving financial training, employees will be aware of the overconfidence bias and the risks of investing.

Employees tend to invest more when they are familiar with the stock, for instance their company stock or stock held by people in their inner circle. People rate their company's stock as safer than a well-diversified domestic-stock fund. This is due to lack of knowledge and the overconfidence bias, since employees are overconfident of their judgment and the judgment of their inner circle.

3.3.5 Weight of past performance

When making investment decisions, people put more weight on past performance (Barbaris, 2003). Employees especially buy stock when past returns were positive. Employees especially tend to buy stocks when past returns of these stocks exceed returns of the S&P 500 (Johnsson, 2002). This is a result of herd behavior: when a lot of people are buying certain stock it appears to be a good choice and others will follow. Of course it is also due to lack of financial knowledge: investors do not take luck or out-performance into account, which indicates lack of understanding of financial markets. Employees tend to buy more when returns are positive whereas they tend to sell less when returns are negative. This is a result of loss aversion or the regret bias: people tend to hold on to losing stock, because they don't want to feel the pain of regret when the stock will rise again and they already sold it with a loss. Also, they put more weight on financial losses than on gains. This is in conflict with financial theory, that advocates one should buy when the price is low, and sell when the price is high.

3.3.6 Lack of planning

Employers lack the ability to plan their pension, even though the wealth of planners is significantly greater. This is consistent with the self-control bias, since employees don't have the discipline to plan their pensions and to set sufficient money aside. It is also consistent with the hyperbolic discounting bias, which states that people put more weight on rewards in the near future than on rewards in the far future. Pensions can be seen as rewards in the far future and therefore employees are scarcely influenced by it now. In 1999 Benartzi and Thaler discovered that 58 percent of respondents in their study spent one hour in calculating their contribution rate and choosing their portfolio allocation. Since the future is not tangible, it doesn't stimulate the planning of pensions (Previtero, 2010). The 2001 Employee Benefit Research Institute's (EBRI) Retirement Confidence Survey (RCS) showed that only 39 percent of employees adequately tried to plan their pensions. The RCS also indicates that employees acknowledged they didn't have enough information nor help to plan their savings. Some employees only start saving late in their lifecycle when they earn a higher income. However, they will not be able to accumulate enough capital for their pension when they do so.

The above described patterns in the saving process of employees are now linked to behavioral biases. Pension funds should take these biases, like the overconfidence and optimism bias, into account when designing DC plans. By doing that employees will make better decisions and consequently their wealth will be enhanced. I will now look at the design of and errors in existing DC plans, mainly in the US. As a result of this study I will make suggestions and improvements in the design of DC plans. We will now turn to the 'supply' side of the pension market: the offered DC plans.

4 Defined contribution plans

In this part I will study existing DC plans in order to find errors in and improvements for the design of DC plans. I will also focus on what points are important when offering DC plans, so biased behavior of employees is less likely. For this study I mainly focus on the US, since almost one third of employees already were in a DC pension plan in the US in 2007 (EBRI, 2010). Choices offered by pension plans are at least as important for optimal savings as are the choices employees make, obviously choices offered influence choices made in DC plans. Since the Dutch pension market is experiencing a shift from DB plans towards DC plans, it is a relevant study to look at how DC plans should take form in practice. Research shows that

designing DC plans in a way that takes behavioral patterns into account instead of trying to change behavior is more effective (Previtero, 2010). I will now appoint the major errors made in the design of existing DC plans and link them to behavioral biases.

4.1 Adequacy

One of the major concerns with offering DC plans, is the lack of financial knowledge of employees while they are responsible for their own portfolio allocation and return on investments. This lack of knowledge in combination with the optimism and overconfidence bias, unables the employee to make the right investment decisions. The relation between risk and return and diversification will not be well understood, while employees do not see the need of this understanding due to the optimism and overconfidence bias. It is therefore important that the choices offered to employees are adequate: not too risky, not underperforming and a sufficient range of choices.

For six out of ten people their 401(k) account is the only capital at pension date. In a research of 400 DC plans in 2001, 62 percent of the choices offered by pension funds are inadequate (Elton, 2004). The consequence of an inefficient set of choices is that a pension can be worth 300 percent less. According to Elton pension funds can do two things wrong considering the choices offered to its consumers. First they can offer the wrong type or the wrong number of choices and second they can offer underperforming investment choices. The first problem could be solved because employees could invest for themselves and diversify their portfolio, but as stated above 60 percent of employees don't do that (Elton, 2004). Pension funds have to be aware of the fact that for the great majority of their members only hold a portfolio within a DC plan, therefore DC plans should offer a wide range and the right type of choices, so employees are able to create a well-diversified portfolio. The second problem Elton (2004) mentioned, of offering underperforming choices should clearly not take place. Although offering above average performing funds, doesn't have to contribute to portfolio turnover either, since transaction costs in these funds could entirely offset the extra return (Bodie, 2007). The average DC plan has among 11 to 20 options available, however after a certain point, complexity increases and enrollment in pension plans decreases, when more investment options are added to the plan. There exists a negative correlation between participation in DC plans and its number of funds offered (Previtero, 2010). Iyengar, Jiang and Huberman (2004) show that participation decreases by 2 percent when 10 more options were added to the plan. In the Netherlands employees are automatically enrolled, so participation will not decrease when more investment options are added to the plan, however complexity could still increase. Pension funds could draw the line at 20 investment options or

at least be aware of the fact that ‘the more the better’ does not hold when offering investment options.

4.2 Dynamic

Employees do not plan their future pension carefully nor calculate their needed future pension thoughtfully. Blake (2008) argues that current DC plans are inadequate, since pension funds do not take the desired way of living after retirement into account. Take this responsibility as a pension fund, be aware of the hyperbolic discounting and status quo bias and make the members in DC plans plan their future pension. Pension funds could do this by first looking at the desired pension outcome and after that determining the right inputs: confront employees with their expected future pension. With this backward way of thinking pension funds can personalize DC plans by taking different desired pension outcomes into account. This is what is called a dynamic way of saving and by doing this DC plans always have a target pension for every member. DC plans look like DB plans by doing this, since they promise to deliver a desired pension outcome, but which is still unsecured in DC plans. Due to hyperbolic discounting employees will prefer spending money now and saving less for the future and they will prefer staying in their current situation (saving too little) than changing it due to the status quo bias. Therefore DC plans have to be designed from back to front by first setting the desired outcome for a specific employee and secondly choosing the right inputs. In order to make future pensions more tangible, pension funds could emotionally involve participants in their plan. Benartzi, Iyengar and Previtro (2010) show that after asking members of DC plans how they would feel if they needed financial support of their children at retirement, they were willing to increase their contribution rate by 4 percent.

4.3 Training and seminars

It is not always clear employees lack the financial knowledge to make good investment choices. Due to the optimism bias people overestimate their ability to make good choices and they are often overconfident of their judgment due to the overconfidence bias. Research shows however that investment returns for the average employee in DC plans, is around 2 percent lower than the investment return of professionals (Pratt, 2006). This should be a reason to increase financial knowledge among participants. To increase the knowledge of their members, pension funds could offer them training and seminars. The majority of employees don't have the financial knowledge to make investment decisions that maximize their wealth. By offering the right amount and types of investment choices and by offering a suitable default plan, a part of the problem is solved. However, DC plan members still have to make choices of their own and they are responsible for their own account, which makes it

important for them to have a minimum knowledge level. As stated above, printed information and training appears to have little effect on members' knowledge, hence face-to-face training has to take place (Lusardi, 2004). When offering training and seminars, pension funds must be aware of the fact that employees could perceive the information given to them as advice. However, every employee needs to make different investment choices, which suits their age, risk aversion, wage and investments they hold outside their pension account. General information must be provided by pension funds, containing plan information, general financial information and asset allocation models. Financial education enhances savings, but it is not the solution since round half of employees indeed use the information provided to them (Pratt, 2006).

When pension funds do provide new financial knowledge, employees could be too conservative in their investment behavior. Due to the conservatism bias, people hold on to their beliefs for too long: this is not a strange phenomenon if employees are not confronted with new financial information. Therefore new financial knowledge and information has to be carefully communicated to the members of DC plans.

Employees' lack of planning could also be reduced by financial training and retirement seminars. As employees indicated they are not fully informed on how to plan their future pension. Training and seminars make the future more tangible and as a consequence increase saving rates and improve portfolio allocation. The estimated effect measured by the United States Health and Retirement Study (HRS) of seminars on overall financial wealth is an increase of 18 percent and for the low educated households alone an increase of 70 percent. Low education households hold the smallest amount of financial assets, which could thus be improved by financial education within DC plans. Not only knowledge explains this phenomenon, also the transaction and learning costs of holding stock account for a blockade (Lusardi, 2004). Financial training and seminars can in turn reduce planning costs and positively influence savings. Bernheim and Garrett (2003) show that financial training and information on print media does not influence savings: face-to-face training has to take place (Lusardi, 2004).

4.4 Share of stock

Investments should be less risky and more defensive as DC plans advance in order to protect employees from sudden declines in their capital just before pension date. Employees are often not aware of the risk that comes with holding equity, and they only see the higher return that equity could give on investments. Due to the optimism and overconfidence bias, employees overestimate their ability to make the right choices, in this case investing too much in equity,

while being overconfident in their judgment. Pension funds could help employees by partly replacing stock in members' portfolios by bonds and cash as retirement age approaches. This could be done automatically: pension funds could implement target-date funds (TDFs) or life-cycle fund, which is a well- diversified portfolio with stock, bonds and cash and automatically diminishes the share invested in stock as time passes. The benefit here is that employees are being more protected against a sudden stock market decline just before retirement. It is important that as time passes less risky investment choices are made and a more defensive investment strategy is implemented. A general TDF could improve the average portfolio held by DC members, since they don't have to choose between alternatives. Research shows that TDFs can improve currently hold pensions by uninformed DC plan members. Employers could extent this strategy by responding to members risk aversion and human capital risk. Workers that are more risk averse and highly exposed to market risk are better off being offered a safe target-date fund, which guarantees a certain outcome at retirement date by offering a real annuity contract, comparable to an inflation-protected life annuity (Bodie, 2007). A (safe) TDF could be a good alternative for the default plan.

Research has shown that equity on the long run has a positive influence on portfolio performance and equity returns tend to revert to their mean. Holding more equity could lower contribution rates and could increase pension outcome, though clearly with higher risk. Only when in the last few working years a passive strategy is being followed or employees are willing to work a few years longer, holding more equity is profitable. This should be communicated to DC plan members which is often not the case, since pension managers nor employers are responsible for a certain pension outcome in the future (Blake, 2008).

4.5 Opt-out

In the Netherlands employees automatically participate in the second pillar. However participation problems do exist in the United States, where employers can choose between an opt-in and an opt-out strategy. With the opt-in strategy employees have to take action to participate in a pension plan as opposed to an opt-out strategy, where workers have to take action to not be part of a pension plan. People tend to prefer the current situation above change, the status quo bias and this bias could be overcome when choosing the opt-out strategy: employees automatically participate and have to change it if they do not want to. Clearly the opt-out strategy significantly increases participation. Participation in DC plans can be stimulated through replacing the opt-in approach by simply asking new hires if they would like to participate in a DC or not. This is not an opt-out strategy where employees are automatically enrolled, however this simple modification in an employee contract will

increase participation in DC plans by 28%, since employees don't have to take any action (Previtero, 2010).

4.6 Correct default plan

Default plans are good on the one hand, since employees don't have to make difficult investment choices themselves: employees' lack of knowledge is now less important. On the other hand default plans come with a risk, since every employee needs a different pension plan but prefers the status quo: staying in the pre-selected plan. The majority of employees tend to choose the default plan, which is a pre-selected plan with a fixed contribution and portfolio allocation. The employees contribution is often set at 3 percent, which is in most cases not sufficient to build up enough capital, however employees stick to the plan. The Accumulation Projection Model of EBRI (2010) shows that automatic enrollment plans with a 3 percent contribution rate negatively influence the replacement rate of the highest income households. Employees often see the default plan as advice, it must be communicated that this is not the case. Pension funds must be aware of the influence default plans have on their members' wealth, since the majority chooses the default plan and sticks to it. The default plan must be considerably well thought out with contribution rates that are high enough or automatically increasing contribution rates and a well-diversified asset allocation. Pension funds could also consider rebalancing the default plan, since most employers don't do this at all. Contribution rate must be sufficient to build up the pension needed in the future and employees should be told that the default plan is not the optimal plan per se: again employees could see this pre-selected plan as advice, as a plan that must be good.

Pension funds can also choose for qualified default investment alternatives (QDIAs), a new sort of default investment. Here employees only select the expected year of retirement and fund managers allocate the portfolio and rebalance it (Previtero, 2010).

The default portfolio and default rules have to be carefully chosen, since they have a great impact on member wealth. There appears to be a great difference between offered default plans and as a consequence two equal-income employees could have significantly different pension outcomes. Default funds differ in their asset allocation, fund options and the implementation of life-cycle profiles. Default plans that offer life-cycle funds which decreases equity with time, significantly reduce the range of pension outcomes and thus make the investment less risk full (Byrne, 2007).

To enhance savings pensions funds can offer Save More Tomorrow plans (SMarT) which automatically increase contribution rates for 401(k) plans. It helps overcome three behavioral biases: self-control, loss-aversion and status quo bias (Dicenzo, 2007).

4.7 Company stock

Company stock is, in the United States in particular, disproportionately present in DC plans. A risk of holding company stock is that company performance, income as well as pensions are strongly correlated with each other: when the company is doing bad your income and capital will decrease. Employees believe equity funds have the same risk as company stock, however equity funds are well-diversified: since company stock is familiar, employees don't see the risk of (disproportionally) holding the stock. Meulbroek (2002) calculated the cost of non-diversification and showed that employees with the greatest share in company stock owned a portfolio worth 42 percent less than employees with well-diversified portfolios. Companies tend to build up the share of their own stock when they are more profitable (Huberman, 2004).

4.8 Transparency

During the financial crisis it came to light that most pension funds charged too much costs and members were not really aware of it: pension funds should increase transparency for their members. Since employees are responsible for their own account, they should have the right to know exactly what their options and the consequences of their decisions are. Pension funds could provide employees with long-term statements to make them conscious of their future wealth and they should allow them to have constant access in portfolio overview online (Previtero, 2010). Transparency will increase the awareness and knowledge about the future pensions of employees, by being transparent pension funds involve employees. Transparency will also enhance responsible behavior of pension fund managers since they are being monitored in a way.

4.9 Rebalancing

One of the patterns employees show in the saving process, is that the great majority do not seem to rebalance at all. It is however advisable to rebalance at least once a year, in order to remain the same risk profile. Employees prefer the status quo and do not have the self-control to rebalance their portfolio in a way that their risk-profile stays the same. Employees could also not be aware of the necessity due to lack of financial knowledge. Pension funds should first of all make the importance of rebalancing clear when training the employees and secondly pension funds should consider rebalancing the portfolio's of their members themselves once a year. It shows in practice that employees hold on to losing stock, since they are afraid of loss in their capital and they hope the stock will recover. When pension funds rebalance their members portfolio, employees will not have the chance to hold on to losing stock and the loss aversion bias will not be noticeable.

Although the principal agent problem is no part of behavioral finance, it is important to take principal the agent problem within pension administrators into account. In order to optimize members' wealth, pension fund managers must operate in their best interest, which is not always the case. Pension fund managers tend to invest in funds where they profit from: some funds pay managers a fee when they let their members invest in the fund, what is called the kickback fee (Morningstar, 2010). Consequently pension fund managers subjectively choose among funds, instead of rationally chose the best investments for their members. Pension funds should not invest in kickback funds nor be influenced by it. To help overcome the principal agent problem an employee and retiree could be made member of the board of the pension fund. In this way each party is being represented.

As shown above pension funds and employers make errors in the design of DC plans and they should make improvements, so they take the behavioral biases of their members into account and increase their members' wealth. In the Netherlands a new pension administrator, Befrank, is currently entering the pension market and it offers Dutch employees DC plans. In the next section I will look at how Befrank offers its DC plans to employers and what it could improve based on the knowledge we now have of behavioral biases and common errors made in DC plans.

5 Befrank

Befrank is the first premium pension institution (PPI) in the Netherlands to offer DC plans. A PPI manages the assets of pension members but it is not allowed to bear any risk. This means that all assets will be placed under a separate and independent securities Depository Company, therefore even if Befrank will go bankrupt pensions will be safe (Befrank, 2010). Befrank is a joint venture of Binck Bank and Delta Lloyd, for the structure see figure 1¹. In the Netherlands already exist two pension administrations: pension funds and insurers and a PPI is a third pension administrator (Roozen, 2010). Befrank is the same as other pension administrators in its profit target, but it distinguishes itself by having low costs and by being transparent. According to the future CEO of Befrank, Folkert Pama (2010), the average pension costs are 236 euros per member per year and Befrank expects to have half the cost

¹ See figure 1

which increases savings. Pama explains Befrank will communicate and do business mainly via internet, this is less expensive. Befrank doesn't automatically offer insurance, however most of the members do like to be insured. In order to give employers the opportunity to arrange both pension plans and insurance in one company, Befrank offers insurance via Delta Lloyd. By doing so, employers don't have to deal with two different parties and two different bills.

Befrank focuses its business on companies with a minimum of 500 employees and pension funds with a collective pension system based on available premiums. Individuals cannot participate in offered plans (Befrank, 2010). The reason why it doesn't focus its business on small companies is that the majority of small sized businesses already have a DC measurement or they have an industrial branch pension. It is nevertheless possible to participate in a DC pension plan of Befrank for small companies (Roozen, 2010).

The DC plans that are offered by Befrank are as follows: the employers have three choices for their employees. They can choose to let their employees follow an active strategy or passive strategy or they could choose to let them invest for own account. In all three cases employees have the option to put money on a savings account instead of investing, which gives employees the opportunity to not invest at all.

For the active strategy Befrank offers Delta Lloyd funds and a range of alternatives for a fee, including some selected stock. However, individual stock will only be offered when there are diversification rules within the programs used by investors, otherwise it would be too risky (Befrank, 2010). These limitations should be integrated in the software first, since employees are often too optimistic in trading (Barberis, 2003). An example of the funds Befrank will offer is the *Delta Lloyd Deelnemingen* fund. This fund that is based on 25 different mid- and small cap companies: it is a well-diversified fund, though not internationally oriented. Employees in the active strategy do not make their own portfolio allocation, their employers choose for them.

For employers who choose the passive strategy, Befrank offers four index trackers via Think Capital, these are: a world tracker, a corporate bond tracker, a government tracker and a real estate tracker. Trackers normally benchmark an index, so investors hold a portfolio allocation, which has the same allocation as a certain index. Therefore employees that follow the passive strategy, don't have to make investment choices themselves, they invest passively. Befrank takes the lifecycle of every employee into account: when the employee is above the age of 45, a safer strategy will be chosen which means that risky funds are represented less in the portfolio and money could be set aside on a saving account. Also, a more defensive

strategy will be implemented every year until retirement date, hence risk automatically decreases over time.

Finally, employees could invest for own account. The percentage of employees that will self invest is expected to be 5 to 10 percent initially (Befrank, 2010). This group of employees will experience behavioural biases in the saving process, so these plans offered by Befrank have to be thoughtfully designed. Employers that self-invest have the choice to buy trackers from Think Capital and 15 Delta Lloyd funds. In the future Befrank wants to offer some selected individual stock, again for a fee. But this will only take place when order limitations will be implemented in the software Befrank uses. Then employees are protected from making certain orders that are too risky. To prevent less informed employees to make suboptimal investment choices, Befrank also offers employees model portfolios, which are pre-selected portfolio's with chosen risk profiles. When employees choose the model portfolio, Befrank will rebalance it when needed in order to remain the same risk profile. These portfolios have a lifecycle; investments will automatically be less risky as retirement date approaches. In the active and passive strategy rebalancing is for own responsibility (Binck Bank, 2010). Therefore the importance of rebalancing has to be communicated to employers and employees with financial training.

It is questionable if there are enough investment options offered by Befrank. As stated above DC plans should offer adequate choices. As long as there is no selected stock available as investment option, the active strategy only has a range of Delta Lloyd funds and the passive strategy only has Think Capital trackers. Consequently employees in the active and passive strategies are dependent on only one company, either Delta Lloyd or Think Capital. The Delta Lloyd funds that are offered are also not very transparent for employees, how do they now what they are really buying? Unless Befrank precisely specifies where the Delta Lloyd funds consist of, it will not be transparent for employees. Befrank could offer more adequate investment options by offering some more options in the form of individual stock. This automatically increases transparency, freedom and risk when desired, while it decreases dependence on Delta Lloyd.

The majority of employees tend to choose and stick to the default plan. Befrank does not offer such a plan for everyone. Only the employees that self-invest could choose model portfolios, which are pre-selected plans with different risk profiles. The model portfolios also have a life-cycle, which means it automatically diminishes the share of equity as time passes. Befrank also rebalances these portfolios when needed, in order to remain the same risk profile. This option should be given to every employee, since it gives the employee a lot of

benefits. Employees prefer the status quo and this results for example in not rebalancing and not diminishing equity as time passes. The model portfolios give a solution to this problem. So make the model portfolios available for every member.

In order to decline herd behaviour, an observed bias in practice, Befrank should communicate that every employee needs a different portfolio. The employees in the active strategy don't seem to be able to choose a risk profile or life-cycle: they have to do this themselves. When Befrank would make employees choose between risk-profiles and automatically implemented life-cycles, herd behaviour has a lot less chance to exist. The status quo bias will also decline from this implementation, since employees do not have to change their portfolio allocation themselves.

Delta Lloyd funds should be specified for employees, so they know where the funds consist of, in order to increase transparency. Transparency is important for pension funds, since employees already have a lack of knowledge and non-transparency aggravates this. Both employers and employees can contact Befrank or visit the website to look into the portfolio. They have a real-time insight in their portfolio and pension information. Every member will have an online 'pension checking account' and he or she can see what happens to the portfolio and money account. Members are able to make simulations and see what happens to return on investment and their pension at pension date (Roozen, 2010). There is also a straightforward cost structure: employers pay premiums, administration costs and insurance premiums in case their employees are insured through Befrank. Workers pay their part of the premium, investment costs which is a percentage of their pension capital and if they self-invest they pay for transaction costs. There are no hidden costs (Befrank, 2010). Befrank has to be transparent in a way, that employees have a realistic view of their future pensions, their choices and risks.

Business mainly takes place via Internet. Employers and employees have a real time insight in their pension plan and communication takes place via Internet and telephone. It is questionable if business solely via Internet is enough. Employees, in particular the employees that will self-invest, could have the need to have face-to-face contact and receive face-to-face information (Lusardi, 2004). For the elderly Internet excess will also be more difficult, since they often do not understand how the Internet functions. Besides these two points, employees and employers could find it unpleasant to have impersonal contact. Since Befrank will do it business via Internet, every member of Befrank should be guided through the website and become familiar with the options the website gives. It would be advisable if Befrank has contact persons for questions, help and training who can be reached in person and by telephone.

Employees are not free to set their own contribution rate, contributions are set for every strategy chosen and it increases with age. However, in the near future it will probably be possible for employees to increase contribution, which is advisable (Binck Bank, 2010). It will only increase wealth for employees as well as for Befrank, so offering to increase contribution would be beneficial. Befrank could implement an automatically increasing contribution rate. Employees often don't have the self-control to increase their contribution and they tend to overspend money. By implementing an automatically increasing contribution rate, the self-control bias will be declined.

Befrank will offer all its clients seminars and financial information; it has already informed future employers who have chosen the active strategy for their employees. Befrank also wants to coach passive investors and employees that are in an opt-out contract, but Befrank has not decided on this yet (Binck Bank, 2010). For the employees that self-invest it is most important to be offered financial education in order to increase their knowledge, since they are responsible for own account. Befrank will financially inform employers and employees by written media: this is however not enough. Befrank has to be aware of the responsibility they give employees by self-investing. Employees lack the knowledge to make the right decisions and when they make decisions they are biased. As stated above, financial training could decline the optimism and overconfidence bias. The CEO of Befrank acknowledges that only sending clients a yearly pension statement is not enough. He is aware of the fact that communication with employers and employees within DC plans has to be evidently present, and in this case online and interactive (Befrank, 2010). Befrank could make its members aware of behavioral biases and give examples of it. By doing this, not only DC plans take behavioural biases into account, but the employees too.

One of the bias of employees is that they are loss averse: they put more weight on losses than on gains and this often results in holding on to losing stock. Befrank could take this bias into account by developing software that automatically sells losing stock. By doing this employees will be protected against losing too much capital.

In order to increase awareness, make the future more tangible and increase savings, Befrank could show members possible outcomes when choosing different strategies. By doing this, employees can see for themselves what their return on investment and risk is when making choices. This will help overcome the overconfidence bias, since employees will be guided when estimating probabilities and judging investment decisions. When showing employees what their future pension will be with their current chosen portfolio, it could trigger employees to save more. People tend to put more weight on rewards in the near future

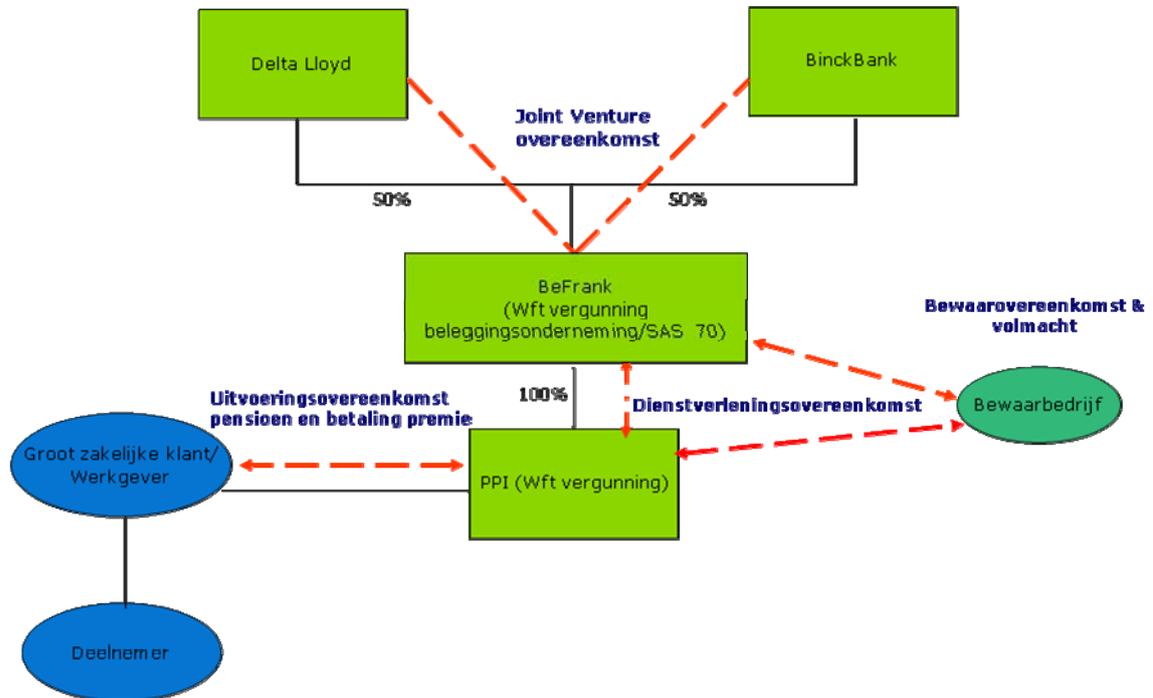
than in the far future. This is called hyperbolic discounting and could express itself in saving too little. When Befrank confronts employees by what their future pension is expected to be, hyperbolic discounting could be declined.

Befrank does not automatically offer company stock. Only in the future is there individual stock available on request, which also holds for Binck Bank and Delta Lloyd shares. Befrank emphasizes on diversification of portfolios and risk aversion by not standard offering stock and by putting limitations on the amount of stock in portfolios. Considering the fact that company stock is often disproportionally present in employees portfolios and the fact that company stock is strongly related with income and pension outcome, it is advisable to put limitations on the amount of stock employees could hold of Binck Bank and Delta Lloyd. Since employees tend to overestimate the performance of stock they are familiar with, Befrank should protect employees.

Befrank has a dynamic way of saving and looks at desired outputs first before it will choose the right portfolio model for an employee. Befrank pays attention to the fact that for every worker and every lifecycle a different portfolio is needed. This could help overcome the status quo bias, since employees could be triggered to contribute more to their account when they are confronted with their future disposable income. Befrank should ask employees how they would want to live in the future, in order to obtain a certain target pension outcome. A dynamic way of saving also helps overcome hyperbolic discounting, which expresses itself by saving too little and preferring to consume more now than later. When employees are aware of what the outcome of their saving behaviour is, they could be triggered to change it.

BeFrank

Omgeving en juridische structuur



9

Figure 1, The structure of BeFrank

Conclusion

The Dutch pension system is experiencing a change which drifted from defined benefit (DB) plans to defined contribution (DC) plans (Bateman et al. 2010). Within a DB plan the employee receives an allowance when retired based on salary and years of service. Within a DC plan, pensions are based on the size of and return on investments made by the employee and the employee is responsible for the portfolio allocation. This thesis used behavioral biases in the saving process to find improvements for the design of DC pension plans. The question is: how could DC plans be designed in order to optimize its members wealth considering their behavioral finance?

The study of behavioral finance found behavioral biases that effect decision making in the saving process: the overconfidence bias, optimism bias, anchoring, conservatism, loss aversion, mental accounting, self control, regret, herd behavior, availability bias, hyperbolic

discounting and status quo bias. In the saving process these behavioral biases express themselves in the following patterns: employees follow the path of least resistance, they have a lack of knowledge, they do not optimally allocate their portfolios, they put too much weight on past performance and employees have a lack of planning. Consequently pension funds should design their DC plans in such a way that these patterns will be less visible or eliminated.

The most important results for the design of DC pension plans are that they should offer adequate choices, since employees have to be able to create well-diversified portfolios. Pension funds should offer financial training, since employees often lack the financial knowledge to make the right investment choices. Consequently training and seminars will decline the optimism and overconfidence bias. Pension funds should introduce a dynamic way of saving: first look at the output and secondly to the inputs. People tend to show hyperbolic discounting, which means they prefer rewards in the near future to rewards in the far future, resulting in saving too little for later. Through a dynamic way of saving, employees could be triggered to save more and this will decline hyperbolic discounting. DC plans should rebalance their members portfolios, since the vast majority of employees does not rebalance at all due to the status quo and lack of knowledge. Rebalancing is important in order to remain the same risk profile and DC plans should rebalance portfolios at least once a year for their members so the status quo will decline. DC plans should offer the right, hence more personal, default funds which implement a life-cycle and a different risk profiles. Employees tend to stick to the default plan due to the status quo, which is a pre-selected plan with often an insufficient contribution rate. DC plans could automatically increase contribution rates of their members, since employees lack the self-control to do this themselves.

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