Dutch pension system reform – A step closer to the ideal system?

Broeders, D.; Ponds, E.H.M.

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Dutch pension system reform A step closer to the ideal system design?[1]

Dirk Broeders* and
Eduard H. M. Ponds**

Introduction

Key points

The Dutch occupational pension system was – like pension systems in other countries – heavily affected by the two recent financial crises. The funding ratio, which was at 200 percent at the turn of the millennium and still 144 percent in 2007, dropped to below 100 recently (Figure 1). Although the financial crisis is typically perceived as the immediate cause of this decrease, Dutch pension funds are also vulnerable to more structural developments; and specifically, the increase in longevity estimations, the decline in market interest rates, reflecting lower capital market returns and more volatile financial markets. Recent reforms are aimed at enhancing the sustainability of the pension system.

The Dutch pension system can be characterized in terms of the usual three pillars. The first pillar is constituted by the state old-age pension, which is financed on a pay-as-you-go (PAYG) basis and provides a basic income to all citizens of 65 and over. The second pillar is constituted by job related or occupational pensions. The third pillar consists of individual savings for retirement. Current reforms as proposed in 'the Pension Accord' mainly affect the first and second pillar. The Accord is an agreement between representatives of employers, employees and the government. In this paper we focus primarily on occupational pensions, or the second pillar.

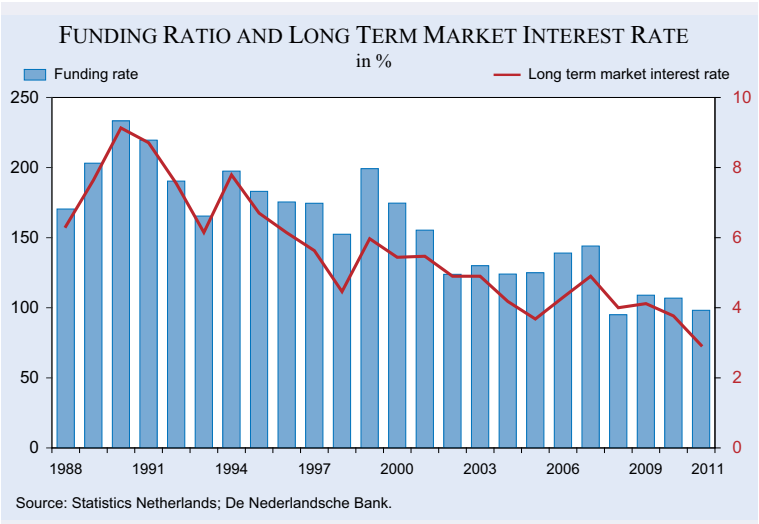
Recent reform proposals: first pillar

In the Pension Accord, the first pillar retirement age will be linked to average life expectancy beyond the age of 65. If life expectancy rises, the retirement age will also increase so that the period over which state pension is received is equal for each generation. This will be reviewed every five years and annual adjustments in the state pension will be indexed to wages in order to strengthen the first pillar.

Recent reform proposals: second pillar

The retirement age in the second pillar will be linked to the retirement age in the first pillar. However, changes in the second pillar are even more profound. The existing defined benefit will be modified into

Figure 1



[1] The views expressed here are those of the authors only and do not necessarily reflect official positions of De Nederlandsche Bank or APG. The authors are grateful to Paul Cavelaars, Paul Hilbers, Zina Lekniute and Sophie Steins Bisschop for useful comments and computional assistance.

* De Nederlandsche Bank.
** APG and Tilburg University.

'nominal contracts'. In addition an innovative pension contract will be introduced. The new contract is identified as a 'real contract' as benefits will be automatically indexed. The indexation target must be at least equal to price inflation. Furthermore, this new pension contract translates financial market shocks and shocks in life expectancy directly into changes in the accrued pension benefits, both positive and negative. These shocks, however, will be smoothed over a maximum period of ten years.

The aim of this paper is to identify the reasons behind the reform proposals and to describe the reform proposals themselves in more debt. After this introduction, we first briefly describe the historical context of the Dutch pension system and the problems it currently faces. We continue by presenting the reform proposals currently being implemented. The article ends by drawing some conclusions on whether or not these reforms are a step closer to the ideal pension system.

Historical context and problem diagnoses

Institutional setting

A pension system has an important function in society. The ultimate goal is to provide sufficient income to the elderly. The income problem can be solved by the working population paying directly for the elderly or, alternatively, by each (group of) person(s) having to save for themselves. In the first case we have a PAYG system and in the second it is a funded system. In the Netherlands, the PAYG system is being used for financing first pillar pensions. Occupational pensions in the Netherlands are collectively financed on a funded basis.

The core of the Dutch occupational pension system is the promise of a highly secure, indexed pension benefit to individuals based on years of service and accrual rate per year. Funding and longevity risks are borne collectively as they are absorbed by adjusting indexation and/or contributions, based on explicit rules. Through a complex set of agreements, institutions and legislation, the core of the Dutch pension system is the potential of the working population to protect the elderly financially. In return the elderly leave excess wealth to following generations.

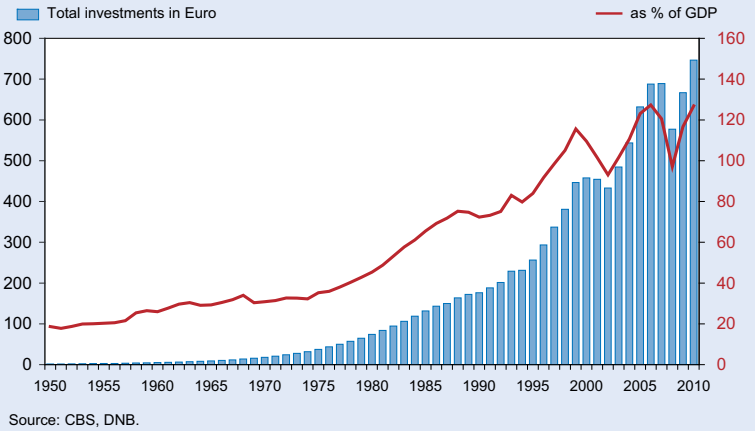
This solidarity is enforced by the government through so-called mandatory participation. Upon the request of the employers' organizations and trade unions, the Minister of Social Affairs and Employment can make membership of an industry-wide pension fund mandatory for companies in a certain industry. Additionally, for most employees, participation in a pension plan is automatically linked to the contract of employment. This is known as the 'employment-related mandatory participation'.

Brief historical overview

It was the Dutch government that started awarding pension rights for its officials and soldiers. The conditions related to pension rights were established in the late 1800s. The first company pension fund was believed to be the Hollandsche IJzeren Spoorweg Maatschappij and was founded in 1845. The foundation of the now largest pension fund ABP, the pension fund for the government and education, took place in 1922. Most industry pension funds also have their roots in the 19th century and first half of the 20th century. In the first half of the last century, retirement provisions developed from a voluntary expression of a good employer into an essential part of labor compensation. After the Second World War, the Dutch pension system reached full maturity.

Figure 2

TOTAL ASSETS UNDER MANAGEMENT IN EURO AND AS A PERCENTAGE OF GDP



Source: CBS, DNB.

The Dutch pension system has been under construction for decades. In the 1950s, 1960s and 1970s there has been a development from fixed amounts schemes, average pay systems to final pay defined benefit schemes. Defined benefit schemes offer members a high degree of pension security. In a defined benefit (DB) scheme, the level of pension benefits are determined by earnings (final pay or career average), the accrual rate, and the number of years of service. A replacement rate of 70 percent of final pay became more or less standard. This included both the first and the second pillar pensions. Widespread coverage of occupational pensions was also reached under the working population. Currently around 95 percent of employees are covered. Figure 2 shows the development of total assets under management from the 1950s until today.

During the mid-1990s growing awareness emerged that labor costs, including deferred pay, should be constrained. In short, this led to a trend towards average pay schemes, away from final pay schemes.[2] In a career average pension scheme the accrual only relates to the salary received in a particular year. If someone earns a flat salary, the outcome is the same as in a final pay scheme; and as in that case, the average wage equals to last salary. However, with salary increases during the career, the average wage is typically lower than the final wage. Therefore, average pay schemes often use a higher accrual rate to achieve a similar expected pension for the average participant as in a final pay scheme.

Industry-wide pension funds versus corporate pension funds

The bulk of assets is managed by pension funds. They are separate legal entities and usually take the form of a trust and are equally governed by representatives of employers and employees. Due to new legislation, the board structure of pension funds will change in the near future. For example, in the new structure retirees' representatives will be part of the board. New legislation will also allow for a board consisting only of professionals. In that case employers, employees and retirees will influence the board's decisions via a representative body with co-determination rights on some important issues.

There are three different types of pension funds. Company pension funds provide pension plans to the employees of a single company. Industry-wide funds provide pension plans for employees working in an industry. Such pension plans are based on a collective labor agreement between an industry's companies and the labor unions, representing the employees in that industry. Finally, professional group pension funds offer pension schemes to specific professional groups (e.g. general practitioners, public notaries). A limited proportion of the pension assets have been outsourced by employers to insurance companies.

Uniform treatment of participants

Dutch pension schemes typically treat participants uniformly in numerous ways see, for example, Kemna et al. (2011). Firstly, active members have a uniform accrual rate. In average pay schemes accrual rates are often in excess of two percent per year. Secondly, all active members pay the same contribution rate as a percentage of their pensionable wage.[3] Thirdly, the indexation rate is the same for participants, although some pension funds differentiate between active members and retirees. Fourthly, the asset allocation policy is equal for all participants. That is to say, the wealth of all participants is collectively kept in a single asset mix. Fifthly, as an ultimate measure accrued benefits can be reduced evenly across participants. For instance, if the funding ratio is below the minimum required funding level of 105 percent, and recovery is not feasible through contribution increases or sponsor donations, benefits must be reduced.

Adoption of fair valuation

Pension funds should be able to meet their obligations. The Dutch regulatory model is based on adequate capital funding, as well as sound conduct of business with proper management of financial risks. Pension funds enter into long-term promises. Therefore, the determination of the present value of pension liabilities is a key regulatory issue. Until 2007 pension liabilities were discounted using an actuarial discount rate. The applicable discount rate was capped at four percent. Some pension funds,

[2] It is typical of final pay schemes that pension accrual must always retroactively be improved to keep pace with individual salary increases. These so-called back service increments have a significant impact on pension costs and therefore labor costs.

[3] The contribution is defined by law as the sum of the actuarially required contribution for the accrual of new pension benefits, an extra sum for buffer requirements, an extra sum for the administration costs and, depending on the relevant policy, an extra sum for the indexation.

specifically with a high indexation target, used a lower discount rate. The fixed interest rate was considered a prudent discount rate as the market interest rates were typically higher.

Around the turn of the millennium, the disadvantages of a fixed discount rate became clearly visible as market interest rates came close to the fixed discount rate. When it comes to assessing the adequacy of pension funds to fulfill their liabilities, market interest rates are obviously an important determinant.

As a result, marked-to-market valuation of liabilities was adopted around 2005.[4] The marked-to-market value of pension liabilities equals the market value of the replicating investment portfolio, being the investment portfolio that generates the same cash flows as the pension benefits promised under all circumstances. The replicating portfolio for defined benefit pension liabilities is that constituted by fixed-rate investments that involve negligible credit risk, such as government bonds and interest rate swaps. Therefore, pension benefits are discounted using the term structure of interest rates derived from the interbank swap market. The replicating portfolio of unconditionally indexed defined benefit liabilities is constituted by index-linked bonds. In some cases the benefit is linked to the performance of another variable. In many Dutch pension schemes, for instance, indexation is linked to the funding ratio (see the next section). In theory, the marked-to-market value of contingently indexed liabilities is determined in the same way, using the replicating investment portfolio. The contingency can be mirrored by a series of financial options, see, for example, Steenkamp (1998), Kocken (2006) and Broeders (2010).

Introduction of contingent indexation

Defined benefit plans around the globe are in decline as a combined result of demographic ageing, low interest rates and volatile investment returns. Therefore, the trend is away from defined benefit and towards hybrid schemes and defined contribution schemes. Dutch pension funds also realized that they had to improve their shock resilience. A first step was taken in the aftermath of the 'dotcom' crisis in 2003. Pension funds replaced unconditional indexation with contingent indexation based on a so-called indexation ladder, see Ponds and Van Riel (2009). This policy ladder relates the indexation to the financial position of the pension fund. The indexation policy ladder is discussed in more detail in the *Existing Contract* Section (below).

Solvency requirements

Dutch pension funds are required to retain additional assets over the marked-to-market value of the liabilities. These assets serve as a cushion and allow them to absorb losses in case of adverse events. Typical adverse events include a sharp decline in interest rates, a large fall in stock prices and lower than expected mortality rates. The solvency requirement is based on the well-known Value-at-Risk (VaR) risk measure on a one-year horizon and a confidence level of 97.5 percent. For an average pension fund the additional assets amount to 25 percent of the liabilities. This confidence level is low compared to legislation for other financial institutions, but the difference can be explained by the additional policy instruments possessed by pension funds like being able to raise future contributions and cutting back on benefits when necessary. In addition to the solvency requirement based on VaR, pension funds must always comply with the minimum solvency requirement. This follows on from the fact that the Dutch Pension Act is based upon the European directive on the activities and supervision of institutions for occupational pensions. This directive prescribes a minimum solvency requirement of around five percent of liabilities.

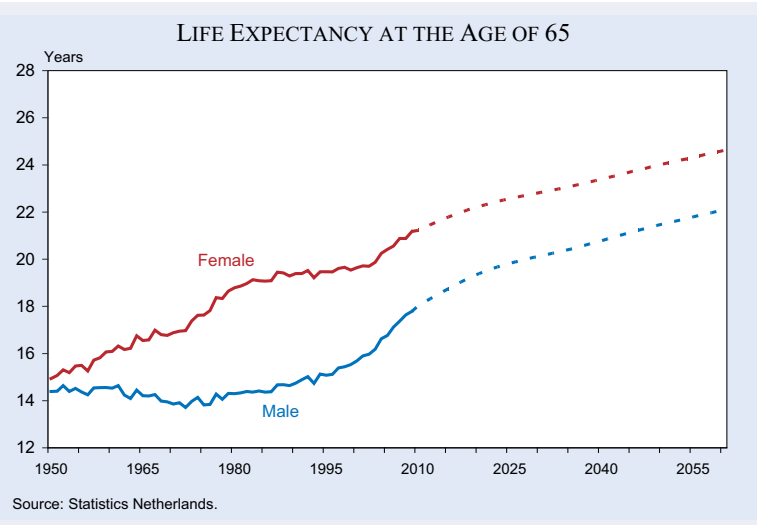
Developments in recent years

In recent years there has been growing recognition that sustainability is at stake. Dutch pension funds have insufficient buffers and control mechanisms to absorb large shocks in financial markets and in longevity estimates. This is the result of a number of trends. Firstly, the increasing degree of maturity makes the contribution as a policy instrument less flexible and less effective. The size of accrued liabilities increases relatively over time compared with the size of contributions, thus weakening the steering power of a flexible contribution policy. Secondly, the prolonged decline in market interest rates led to an increase in the present value of pension benefits. The introduction of fair valuation revealed a high mismatch between assets and liabilities in terms of duration, and thus increased vulnerability to financial

[4] Marked-to-market valuation of liabilities was legally introduced in 2007, however pension funds could voluntary opt for this valuation method from 2005 onwards.

market shocks. This is also due to the fact that pension funds increased their allocation in the 1990s towards equities and other investment categories offering a risk premium. Fourthly, pension fund participants are ageing and they are suffering from unexpected shocks in life expectancy. Longevity risk has been revealed since survival tables are currently based on an extrapolation of longevity estimates, instead of realized survival rates. The result of these four developments is an imbalance between risks and risk-bearing capacity in the pension sector. This challenges the sustainability of the occupational pension system.

Figure 3



Sustainability was placed high on the agenda after the credit crisis of 2008, when funding ratios fell sharply to below 100 percent. There was a fear that pension funds would transform into 'sinking giants', i.e. would be unable to bridge their funding gap, as described in Kocken and Potters (2010). Mature pension funds become uncontrollable sinking giants even after moderate shocks. This is the combined effect of a funding ratio below 100 percent and a heavy dependence on future returns to restore the funding ratio. Furthermore, over 60 percent of total pension assets are earmarked for pensions that have already commenced or will commence within ten years, see Frijns et al. (2010). This not only means that the pension funds' investment horizon shortens, but pension funds may not be able to recover from funding deficits after disruptions in financial markets.

In order to deal with these problems, the Government laid down a road map to sustainability. Two commissions concluded that structural changes are necessary.[5] New pension contracts should make it possible to easily adjust pension benefits in the event of financial setbacks and unexpected surges in life expectancy. Firstly, because the last decade showed that pension funds are highly exposed to a decline in market interest rates and volatile investment returns. Secondly, because pension funds are vulnerable due to the low birth rates and ageing of the population. Figure 3 shows the life expectancy at the age of 65. As this chart shows, life expectancy has risen significantly since the 1970s and is expected to increase further in the coming decades. The combination of longer life expectancy and a 'sticky' retirement age makes pensions more expensive.

Pension Accord

Following the recommendations of the two committees, social partners and the government agreed in the Pension Accord of 2010 that the pension contracts need to be modified. Two flavors were proposed, namely a hybrid contract and a flexible real contract. The hybrid contract provides for a lower accrual of (nominal) defined benefits, supplemented with an investment performance related indexation policy. In the flexible real contract the pension fund offers a real or indexed benefit, but it is not guaranteed. Both types of contracts help to restore the balance by reducing the ambition level for pension funds and by exposing participants more to risk.

The further development of the Pension Accord has led to the Pension Memorandum in June 2011. The memorandum describes how a sustainable pension system is reached along the following lines:

- A complete pension contract,
- Linking pension benefits to life expectancy,
- Linking pension benefits to developments in financial markets,
- Contribution stabilization,

[5] The Government set up several commissions to analyze the Dutch pension system in debt including The Committee on the Sustainability of Supplementary Pension Schemes (Goudswaard et al., 2010) and The Investment Policy and Risk Management Committee (Frijns et al. 2010).

- Transparent communication about risks to participants.

Financial Assessment Framework

A key element of redesigning the pension fund industry is a new Financial Assessment Framework (FTK). Distinctive to the new FTK is that pension funds can choose in the future between two types of contracts: the nominal contract and the real contract. Both contracts must stipulate in advance how risk sharing across stakeholders will be established. The nominal contract needs to have a complete set of policy ladders. The real contract needs to have a mechanism for absorbing financial shocks and a mechanism for absorbing shocks in life expectancy.

Table 1

Impact on the value of participants' claims

	Young	Old
Higher discount rate	-	+
Higher contribution rate	-	+
Excess indexation when the funding ratio is high	-	+
Benefit cuts when the funding ratio is too low	+	-
More buffering	+	-
Price indexation instead of wage indexation	+	-

Source: Based on Lever et al. (2012) and Ponds and Lekniute (2011).

In the course of discussion of the new contracts, concerns were put forward whether they would be fair to the different groups of stakeholders, particularly to young and old participants. As a pension fund has to be seen as a zero-sum game, it should be recognized that any contract redesign might lead to the redistribution of wealth (and risks) between participants. The value to be distributed by the pension fund among the stakeholders is equal to the value of assets and the value of future contributions, see Ponds (2003). Hence the value of the claims of various stakeholders is necessarily equal to the sum of assets plus the present value of future contributions over the evaluation horizon. By definition a contract change will not lead to more or less value in the pension fund. It will, however, lead to adjustments in the way value is allocated to the stakeholders. For example, a more restrictive indexation policy is implemented at the expense of the old, but will benefit young participants. A less prudent method for discounting liabilities stands to benefit the old whereas the young will have an equivalent disadvantage. A balanced distribution of wealth and risks across generations is an important prerequisite for a sustainable collective pension system.

Two recent studies have reported on the direction and size of the intergenerational redistribution for the various proposals (Ponds and Lekniute 2011 and Lever, Mehlkopf and Van Ewijk 2012). Table 1 reflects some of the key findings of these studies in a qualitative way. The table lists the impact on the value of the claims for young and old participants for a number of specific contract adjustments.[6] Typically, in case of high funding ratios, the elderly benefit from excess indexation. They also stand to gain from a higher discount and contribution rate. These measures will increase pay outs in the short run. By contrast, at low funding ratios, benefit cuts, a less ambitious indexation target and more prudence are favorable to the young. The young stand to gain from benefit cuts at low funding ratios, greater prudence via more buffering and a less ambitious indexation target, which will all reduce benefit pay-outs in the short run.

Generational aspects of the reform proposals (an example)

Comparing pension contracts

Table 1 reveals that contract adjustments may influence a pension fund's generational balance. The following section presents a numerical example of the generational consequences of the nominal and the real contract. It begins by defining the settings of these new contracts and then compares the new contracts to the existing contract using valued based Asset Liability Management (ALM). We also comment on the generational aspects of these contracts.

Existing contract

Most pension funds currently run an average-wage defined benefit plan with conditional indexation based on a so-called indexation ladder, see also section *Brief historical overview* (above). For each year of service participants accrue new pension

[6] The horizon considered defines which age groups should be seen as young and old. For a horizon of 25 years the young cohorts are aged 40 and lower. When the horizon is set at 75 years, the young is understood to be the cohorts that are still to be born in the coming 75 years and the elderly are all cohorts already born.

rights determined by their pensionable wage times the accrual rate, typically being equal to two percent. Accrued rights are indexed annually. Diagram (a) in Figure 4 displays the current indexation policy. The y-axis plots the indexation rate as a function of the funding ratio on the x-axis. Full indexation is given when the funding ratio is equal to or higher than the upper boundary of the policy ladder. We use a nominal funding ratio of 135 percent as the upper boundary. This funding level warrants full indexation. When the funding ratio is below the lower boundary of 105 percent funding, no indexation is given at all. In between the lower and upper boundary, partial indexation is granted proportionally to the funding ratio. When the funding ratio is sufficiently high, for example, well above the upper boundary, pension funds can give catch-up indexation to repair for previously missed indexations.

This policy ladder was introduced in 2005 and at that time this was perceived as a key improvement of the previous practice of de facto unconditional full indexation. A main shortcoming of the ladder, however, is incompleteness. There was no explicit policy should the funding ratio fall significantly below 105 percent. In such a case an explicit recovery policy was needed to avoid the sinking giant problem, discussed in section *Developments in recent years* (above), as well as to have a generational fair policy. The regulator came up with additional explicit rules regarding the recovery term. Pension funds with a funding ratio below 105 percent have to recover to at least 105 percent within five years.[7] If the recovery does not take place after that period, then cuts in the accrued rights must be applied.

Nominal contract

The nominal contract displayed in Diagram (b) in Figure 4 is a typical example of the renewal of the policy ladder from the previous section. This example reflects the settings of the 'nominal contract' compatible with the new Financial Assessment Framework (compare above section *Financial Assessment Framework*). The displayed policy ladder explicitly addresses the policy rules for all possible funding levels. Whenever the funding ratio falls below 135 percent, a recovery period of 15 years is allowed to return to a funding level of 135 percent or higher. In order to complete the policy rules in our example, we apply the following rule. If the funding ratio after 15 years is still below 135 percent, then the pension fund needs to reduce liabilities such that the funding ratio meets the upper boundary. Additionally, it is prescribed that in case the funding ratio falls below 105 percent, it must be restored to 105 percent within a period of three years. If not, benefit reductions need to be applied. The new ladder design also explicitly defines policy in case of significant overfunding. When the funding ratio is well above a predefined level, say the upper boundary plus ten percent, the funding surplus can be used for excess indexation above full indexation.

Real contract

The real contract is also a complete contract. It is a new form of how to grant indexation to the accrued liabilities. Diagram (c) in Figure 4 displays this new type of indexation policy. It is worth noting that, compared to current and the nominal contract, the indexation is linear in the funding ratio. The new contract is based on the RAM policy, where the term RAM is the abbreviation of Return Adjustment Mechanism. In this framework, indexation is annually given in full. However, subsequently a correction, either plus or minus, is applied. The correction is related to the actual funding position aimed at recovering to a real funding ratio of 100 percent. After some discussion a consensus has been reached that a recovery period or smoothing period of a maximum of ten years can be used. The RAM indexation takes the form:

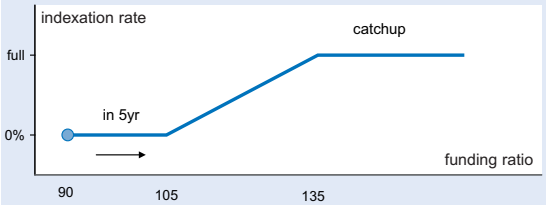
$$\text{Indexation RAM} = \text{wage indexation} + (\text{FR}-100\%)/n \quad (1)$$

Where *FR* is the real funding ratio and *n* represents the smoothing period.

Figure 4a

INDEXATION POLICY LADDERS IN DIFFERENT PENSION CONTRACTS

Diagram a: Current contract: Indexation ladder

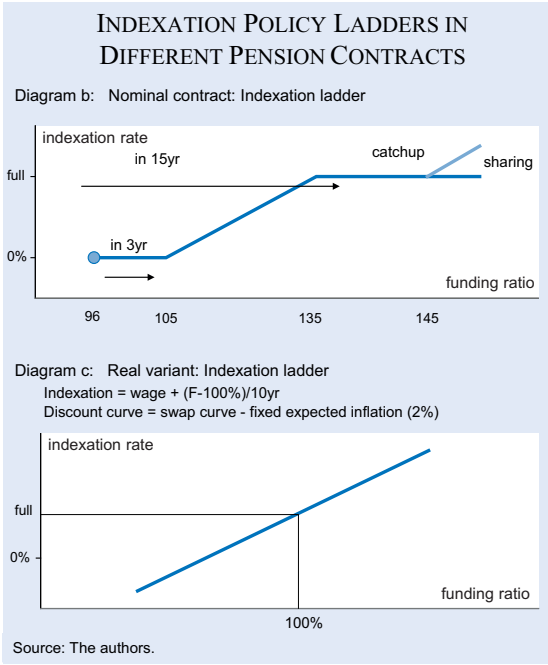


Source: The authors.

[7] Normally the recovery period is three years. However, in case many pension funds together suffer from a shortfall, the Pension Act allows for longer recovery periods to be decided upon by the Government. In 2008 it was decided to increase the recovery period to five years.

Figure 4b and 4c

INDEXATION POLICY LADDERS IN DIFFERENT PENSION CONTRACTS



Source: The authors.

Discount curve

A key topic under discussion is the appropriate discount rate. For the nominal contract the applicable discount rate will remain the zero coupon interest rate curve derived from the interbank swap market, (see section *Adoption of fair valuation* above). Following developments in the Solvency II project for insurers, the Dutch government wants to adopt an ultimate forward rate (UFR) methodology. Although no decision on the specifications of the UFR has been made yet, this would imply that the interest rate curve would evolve in the very long run to the UFR level of, for example, 4.2 percent.[8]

Under the real contract, liabilities are discounted using a real discount rate. There has been a long and intense discussion over what the ingredients for this curve should be. The real curves can be constructed easily from the nominal term structure of interest rates by subtracting the expected inflation rate (or indexation rate).[9]

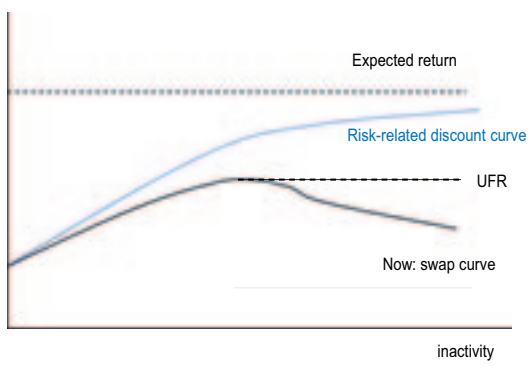
As the liabilities in the new contracts can no longer be perceived as risk-free (i.e., accrued benefits can be cut), it was initially proposed by social partners to use the expected rate of return on the pension funds' assets as the discount rate. This led to significant resistance, specifically from the academic community, as it introduces adverse incentives, like for instance, the incentive to increase equity exposure as that would lead a higher discount rate. Nijman and Werker (2012) have suggested using the swap curve plus a term-dependent surcharge to account for the fact that benefit payments are more riskier the later they are paid (due to the smoothing mechanism). In that case, the outcome would be that the real discount rate is composed of the swap curve, including a UFR plus a term-dependent surcharge. It is worth noting that, for an arbitrage free valuation procedure, the expected benefits (the nominator in the valuation formula) and the discount curve (the denominator) need to be consistent with each other. Figure 5 outlines the current swap curve, the swap curve plus a UFR and the swap curve plus a UFR plus the term-dependent surcharge based on Nijman and Werker (2012).

New contracts are more flexible

The existing and both new contracts will not necessarily lead to different pension results for the participants as long as the realization of economic variables and actuarial variables (e.g., longevity) is in line with expectations at the moment that the funding policy was set. However, they may differ significantly should the markets perform badly and/or were longevity to be underestimated. In the existing contract the implied fall in the funding ratio of these adverse developments cannot be reversed easily by adjustments in the pension entitlements, which may initiate the trend towards a sinking giant. In the new

Figure 5

PROPOSED DISCOUNT CURVE



Source: The authors.

[8] Please note that in the Solvency II methodology the one year forward rate is fixed for very long maturities. The long term zero coupon rate is subsequently derived from this assumption.
[9] Ideally the market consistent expected inflation follows from the relationship between the real and the nominal term structure of interest rates. Since a liquid market for Dutch inflation is missing, an alternative needs to be found.

contracts, the fall in the funding ratio will be tackled more flexibly by a downward adjustment in the liabilities. This endogenous process of adjustment brings the funding ratio back to a level that is sustainable in the longer run. As a result, risks are obviously transferred to the participants themselves.

Discussion results

We now present a closer look at the performance of the different contracts. Below we report the main results for the three contracts from a valued based ALM study. However, we first specify some of the settings used in the ALM study. The horizon of the study is 25 years ahead. The demographic structure of the pension fund is similar to that of the Dutch population. The current pension plan is an average wage plan with a two percent accrual rate per working year and conditional indexation benchmarked against wage growth. All three plans continuously hold the same asset allocation of 50 percent bonds and 50 percent stocks during the evaluation period. It is assumed that accrual and received indexation have been in line with ambition, so that pension entitlements for the various cohorts correspond with the plan ambitions. The economic scenario set of the ALM model is based on van den Goorbergh et al. (2011).

The valuation of liabilities in the current contract is based on using the nominal swap curve. The promised benefits in the new contracts are discounted using the discount curves described in section *Discount curve* (above). The contribution rate in the existing contract is 20 percent of the pensionable wage, in the new contracts the contribution rate is set at 24 percent reflecting tighter supervisory rules (additional solvency surcharge) and the abolition of the practice of basing the discount rate on the expected rate of return net of expected indexation rate.

The initial nominal funding ratio is set at 100 percent based on the valuation of nominal liabilities against the current swap curve (without UFR). In order to be able to compare the solvency position of the three contracts, the funding ratios of the nominal contract and the real contract are recalculated using the swap curve as a discount rate.

Table 2 first displays the pension result at the end of the horizon for individuals who are 25 and 65 respectively at the start of the simulation. The pension result is defined as the actual value of pension rights over the aimed fully wage-indexed value of pension rights. It is 100 percent when the received indexation over the 25 years horizon equals the cumulative wage growth. We report the median and the 2.5-percentile and the 97.5-percentiles of the pension result as indicators for downside and upside risk respectively. Table 2 also reports on the median and the downside and upside risks of the nominal funding ratio. Finally the probability of a benefit reduction (negative indexation) is given as well as the average size of the reduction when it is applied.

The nominal contract in our example is effective in controlling downside funding risk as the probabilities of underfunding and applying benefit reductions are low. The complement is the less favorable outcome regarding the pension result for older cohorts.

Table 2

Key results for the different contract specifications in %

		Current contract	Nominal contract	Real Contract
Nominal Funding ratio	2.50	98	122	97
	50	131	147	137
	97.50	192	221	177
Probability FR < 100%		4	0	3
Pension result 25yr	2.50	68	71	75
	50	100	107	101
	97.50	124	135	135
Pension result 65yr	2.50	45	38	53
	50	82	73	87
	97.50	100	99	133
Contribution rate		20	24	24

Source: Based on the authors' own calculations.

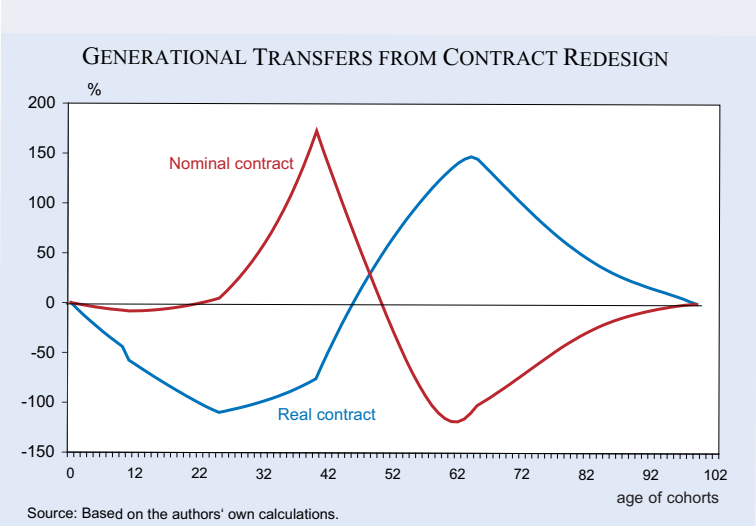
This is primarily to be explained by the requirements that the funding ratio has to be restored to 105 percent in three years and to a level of 135 percent within 15 years. The resulting 2.5-percentile and the median pension for the now 65-year old are lower compared to the outcomes in the existing contract. By contrast, the pension result of the now 25-year old is better than the current contract, as this cohort will hardly be hurt by benefit cuts. This cohort will also benefit materially from the redemption of the overall missed indexation and cuts applied later on in their career as the funding ratio on average recovers to a level above 145 percent.

The table also reports on the consequences of the real contract. In the example, the real contract uses a smoothing period of seven years to absorb deviation of the funding ratio from 100 percent real (or from 135 percent nominal). As the smoothing process is implemented in an 'open manner', the smoothing period is effectively longer than seven years.[10] The pensioners in this contract will be less affected by the initial low funding ratio than in the current contract as the smoothing period is extended from three years in the current contract to seven years in the new contract. The recovery process is much slower than in the nominal contract, implying a lower funding and high probability of underfunding compared to the nominal contract. The overall outcomes for the funding ratio and the pension results for the 25-year and the 65-year old are better compared to the current contract because of the impact of the higher contribution rate (24 versus 20 percent).

Figure 6 displays the generational value effects that result from replacing the current contract with either the nominal contract or the real contract. Along the x-axis the age of the cohorts is given at the moment that the new contracts are implemented. Results are given for the cohort as a whole. Along the vertical axis the effects per cohort are given and these results are expressed as percentage of the initial wage sum of the cohort. These effects are calculated as the change in the economic value of the net-claims of the various cohorts. A positive result means that the specific cohort gains from the contract change, while a negative result denotes a loss.

For the specific settings used and given the initial (nominal) funding ratio of 100 percent, we can observe from the figure that the two new contracts have opposite generational effects. The introduction of the nominal contract favors the young, whereas the move to the real contract benefits the elderly. In the nominal contract the young will lose value because of the higher contribution rate they pay and because of the higher discount rate, which implies more indexation payments to the elderly. However, they gain a lot from the tightening of the recovery process. The elderly lose significant value for two reasons: firstly, because the upper boundary of the ladder is inflated from 135 to 145 percent, and secondly, and most importantly, the requirement in our example is that the funding ratio needs to be at least 145 percent after 15 years. In the real contract the young will lose out on balance. They have to pay more contributions, the discount rate is higher and they must accept that the strict five-years recovery period in the current contract is replaced by the seven-years open smoothing procedure of the RAM.

Figure 6



Source: Based on the authors' own calculations.

[10] The open manner of smoothing follows from the formula, i.e. (FR-100%)/7yr. After 7 years around two-thirds of the initial shock is absorbed, and after ten years this share rises to around four-fifths. Open refers to the fact that entrants in the pension fund participate in shocks that occurred before they entered the pension fund. Initially the RAM contract was supposed to be closed of nature, which means that any shock needs to be allocated to the accrued rights that are in the pension fund at the moment the shock hits the fund, and so will not be borne by new rights to be built up after the shock.

Age differentiation

The results in the previous section reveal that contract changes may easily result in generational transfers. It is very likely that the proposed renewals must be seen as an intermediate step. The new plans, similar to the existing ones, treat all participants in a uniform way. Uniform plan structures do not accommodate heterogeneity among plan members very effectively. More specifically, the interests of young and old members diverge. The elderly will aim for an investment policy oriented towards pension security; while the young will prefer a risky mix for an attractive return.[11] Although this is currently not 'on the table', one step further in the process of the pension plan reform is age-differentiation in risk exposure, as proposed by the lifecycle investment approach, see, for example, Broeders and Rijsbergen (2010). This approach does not necessarily lead to individual accounts. Age differentiation can be organized within collective pension plans by means of an age-dependent indexation policy. One of the main advantages of maintaining a collective plan is that the plan structure, as a system of deferred indexed annuities with risk sharing, can basically be maintained along with the economies of scale of large collective investment pools.

An age-dependent indexation policy can be modeled as a variant of RAM (compare Ponds 2008, Ponds and Molenaar 2012) in the following manner:

$$\text{Age-dependent indexation} = a_x \cdot \text{return indexation} + (1- a_x) \cdot \text{wage indexation} + (FR-100\%) / n \quad (2)$$

With ax is related to age x, for example ax = (65-x)/40, where the formal entry and retirement ages are 25 and 65 respectively. As in (1) FR stands for real funding ratio and n for the smoothing period in years. As in the basic RAM variant, the participants first receive full indexation which, for all ages below the retirement age of 65, consists of an age-dependent mixture of return-linked indexation and wage-linked indexation. Subsequently a correction is applied as in the RAM, which is the same for all ages. For example, a cohort of the age of 45 will receive half of the indexation from the return and the other half linked to wage growth.

[11] A key parameter in the optimal asset allocation is the correlation between human capital and financial capital. As long as the correlation between labor income and stock market returns is assumed to be low, young workers may better diversify away equity risk with their large holding of human capital.

Closer to the ideal system?

The Dutch pension system ranks high in international comparisons (see, for example, Knox 2012), however its long-term sustainability has also been questioned (Jackson, Howe and Nakashima, 2010). The Pension Accord, the new pension contracts and the new regulatory framework are key contributors to a sustainable pension system. Certain steps have been defined as to crucial aspects, particularly a higher retirement age and an automatic linking to any further increase in life-expectancy, and a more shock-resilient pension fund system, as the proposed new contracts are based on explicit rules regarding who has to bear downside risks. The evolution towards the new pension fund contracts is necessary for the system to retain the advantages of collective risk sharing and economies of scale. In an ageing society, a low interest rate environment, and a world with volatile investment returns, it is inevitable that participants in pension plans are exposed to risks. Maintaining collective pension schemes, however, requires a balanced distribution of wealth and risk across generations. This is a challenging task as this distribution is easily affected by changing contract specifications or regulatory parameters.

The Dutch pension system has always been adaptive to changing circumstances and ongoing renovations are also likely to happen. It is highly probable that pension funds will cooperate, creating a trend towards a small number of large pension funds. There is still high support for pension plans based on collective and risk sharing, however to address the specific interest of younger and older participants, it is likely that age-differentiation will be considered as a possible next step.

References

Broeders, D. (2010), "Valuation of contingent pension liabilities and guarantees under sponsor default risk", *The Journal of Risk and Insurance* 77(4), 911–34.

Broeders, D. and D. Rijsbergen (2010), "A Life-Cycle Approach in the Dutch Occupational Pension System?", *Rotman International Journal of Pension Management* 3(1), 52–59.

Frijns, J. M. G., J. A. Nijssen and L. J. R. Scholtens (2010), *Pensioen: Onzekere zekerheid*, Commissie Beleggingsbeleid en Risicobeheer, English summary available.

Goorbergh, R. W. J. van den, R. D. J. Molenaar, O. W. Steenbeek and P. J. G. Vlaar (2011), "Risk models with jumps and time-varying second moments", *SSRN Working Paper*, http://ssrn.com/abstract=1816371.

Goudswaard, K. P., R. M. W. J. Beetsma, T. E. Nijman and P. Schnabel (2010), *Een sterke tweede pijler, naar een toekomstbestendig stelsel van aanvullende pensioenen,* Committee on the Sustainability of Supplementary Pension Schemes, English summary available.

Jackson R., N. Howe and K. Nakashika (2010), *The Global Aging Preparedness Index,* CSIS Center for Strategic and International Studies.

Jong, F. de and P. Schotman (2012), "De RAM in het nieuwe pensioenakkoord", *Netspar Design Paper.*

Kemna, A. G. Z., E. H. M. Ponds and O. W. Steenbeek (2011), "Pension funds in the Netherlands", *The Journal of Investment Consulting* 12(2), 28–34.

Knox, D. (2012), "Benchmarking Retirement Income Systems around the World: Which Countries Rank Highest and Why?", *Rotman International Journal of Pension Management* 5(1), 4–14.

Kocken, T. P. (2006), *Curious Contracts,* Tutein Nolthenius, 's-Hertogenbosch, The Netherlands.

Kocken, T. P. and J. Potters (2010), "Sinking giants", *Life & Pensions,* May.

Lever M., R. Mehlkopf and C. van Ewijk (2012), "Generatie-effecten Pensioenakkoord – Op verzoek van het Ministerie van Sociale Zaken en Werkgelegenheid", CPB, 2012.

Molenaar, R. and E. H. M. Ponds (2012), "Risk sharing and individual lifecycle inves-ting in funded collective pensions", *Journal of Risk,* in press.

Nijman, T. and B. Werker (2012), "Marktconsistente waardering van zachte pensioen-rechten", *Netspar Design Paper,* in press.

Ponds, E. H. M. (2003), "Pension funds and value-based generational accounting", *Journal of Pension Economics and Finance* 2(3), 295–325.

Ponds, E. H. M. (2008), "Naar meer jong en oud in collectieve pensioenen", Inaugural speech at Tilburg University, 11 April, http://www.uvt.nl/webwijs/show/?uid=e.h.m.ponds.

Ponds, E. H. M. and B. van Riel (2009), "Sharing risk: the Netherlands: new approach to pensions", *Journal of Pension Economics and Finance* 8(1), 91–105.

Ponds, E. H. M. and Z. Lekniute (2011), "Pensioenakkoord en effecten voor genera-ties", *Netspar Discussion Paper,* 2011–66.

Steenkamp, T. B. M. (1998), *Het Pensioenfonds Vanuit Een Corporate Finance Perspec-tief,* Kluwer, Deventer.