

The Promise of Defined Ambition Plans: Lessons for the United States

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Abstract

We explore Dutch proposals for defined ambition plans in an occupational pension context. Firms no longer act as external risk sponsors but continue to provide a distributional platform for pensions, thereby addressing behavioral and agency issues as well as imperfections of insurance and financial markets. Pension entitlements are defined in terms of (deferred) annuities, and participants share the risks of assets and a joint liability pool on the basis of complete contracts. We investigate risk management and valuation of these plans, explore their strengths and weaknesses, and analyze whether such plans hold promise for the United States.

Keywords: Defined ambition, variable annuity, valuation, risk profile, risk management, liabilities, consumption frame

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This chapter explores defined ambition (DA) schemes that provide variable annuities to participants. These schemes are based on occupational pension schemes in the Netherlands in which participants—rather than an external sponsor—bear the balance sheet risks of pension funds. These Dutch schemes have evolved from traditional defined benefit (DB) schemes with employers as external risk sponsors. The government of the United Kingdom is looking at DA schemes as one of the ways to strengthen occupational pension provision in the UK (Department for Work and Pensions 2013). Also some public sector pension schemes in the United States are considering risk-sharing among participants as a way to reduce plan costs and risks imposed on taxpayers as external risk sponsors (e.g., Novy-Marx and Rauh 2013). Our analysis addresses the key issues associated with a move from the DB design towards DA schemes.

The chapter is structured as follows.¹ First, we describe the Dutch pension system, followed by an investigation of the major strengths of Dutch occupational schemes. Next, we analyze the major weaknesses of Dutch occupational systems as revealed by the financial crisis. These weaknesses originate in the legacy of the DB design in terms of (1) communicating and setting risk exposures; (2) valuing annuities; and (3) accruing new benefits and determining pension contributions. These weaknesses led to proposals for DA schemes. We then describe the key features of these schemes and describe the Dutch policy debate on occupational pensions in general and DA schemes in particular. This includes a review of various obstacles to the actual implementation of DA plans. Subsequently, we draw lessons for the United States by comparing DA schemes with mainstream defined contribution (DC) schemes. Finally, we offer conclusions on the promise of DA for the United States, including for public sector plans.

Dutch Occupational Pensions

Three-pillar system. The Dutch pension system consists of three pillars. The first is a pay-as-you-go public pension scheme. This Beveridge-type public system provides a uniform, flat pension to all residents at a level that is related to the minimum wage rather than individual earnings. Most other continental EU countries, by contrast, feature Bismarckian earnings-related public pensions. Accordingly, compared to other EU governments, the Dutch government provides only a relatively small part of pension income for workers who earn middle and higher incomes. If these workers want to maintain their standards of living in retirement, they need additional pension provisions. This is where the second pillar of pension provision (i.e., occupational pensions) enters the picture. In contrast to the first pillar, the second pillar is earnings-related, and it aims to maintain the standard of living of middle-class workers during retirement. The third pillar consists of voluntary personal pension provisions, which are tax-favored up to a ceiling. This last pillar is especially important for self-employed individuals who lack occupational pension provisions.

Occupational pensions. Our chapter focuses on the occupational pension schemes in the second pillar. These are typically part of labor contracts negotiated between unions and employers in collective labor agreements; employees are thus obliged to participate in the negotiated pension scheme. As a result, occupational schemes cover more than 90 percent of the labor force. These schemes are funded, and the value of assets in the second pillar currently amounts to about one trillion Euro (140 percent of GDP).

Dutch pension funds are independent trusts with their own governance and administrative structures. The governing board of a pension fund has traditionally consisted of equal representatives of employers and unions, although recently retirees and independent specialists can also become board members. These representatives act as fiduciary trustees. Industry-wide pension funds arrange pensions for workers in a specific sector of the economy. These sectoral

funds own more than two-thirds of the assets in the second pillar, and account for more than 80 percent of active participants. A company can opt out of an industry fund only if it offers a better pension plan than the plan offered by the sectoral fund.² This mandatory participation of firms in sectoral arrangements contributes to the high coverage of occupational pensions in the Netherlands.

Benefit entitlements in terms of annuities. The occupational plans seek to generate a specific lifetime income stream during retirement, and property rights are defined in terms of a (deferred) annuity. Years of service and a reference wage typically determine the benefit entitlement level. In the past, the reference wage was the final rate of pay, but over the last decade, most funds have moved to career-average schemes. In the latter schemes, entitlements to deferred annuities accrue based on a percentage of the average wage level during the career. These schemes typically aim at an annuity level of about 75 percent of average pay (including the flat public benefit) after 40 years of service. The benefit accrual (in terms of annuity level) is uniform across age groups. Hence, if the aim is to provide 75 percent of average pay after a working career of 40 years, the annual accrual rate is $75 \text{ percent} / 40 = 1.875 \text{ percent}$. The uniform accrual rate of annuity units implies that benefits are backloaded, because the time value of money implies that the value of the (deferred) annuity (as a percentage of the wage) rises with age. Industry funds charge the same premium rate for the annuity units irrespective of age. Hence, firms with a younger workforce subsidize firms with an older workforce.³

The goal is to index the deferred annuity to the development of contractual wages during the accumulation phase. Some funds also aspire to link annuities to the development of contractual wages during the payout phase. Other funds aim to provide cost-of-living adjustments during the decumulation phase.

Payout conditional on performance. The aspired annuity levels represent the plans' ambitions rather than a guarantee. That is, a pension fund aims to index the pension rights, but the bonus payments are conditional on the financial performance of the fund. Not only is indexation conditional on fund performance, but also the nominal (or 'base') pension can be cut if the assets of a fund fall below the value of the nominal liabilities (i.e., the value of the annuities excluding indexation).⁴ Dutch solvency regulation requires that a funding shortage (calculated on the basis of the value of nominal liabilities) is resolved within a three-year period in expectation. The length of the recovery period has temporarily been increased to five years in the aftermath of the recent financial crisis. In calculating the scope for recovery, funds can use expected returns on assets. Hence, risk premia on risky assets are assumed to contribute to the potential for recovery. But funds are not allowed to increase mismatch risk if they are in a recovery program.

Nominal liabilities computed with market interest rates. For the purpose of solvency regulations, Dutch pension funds must calculate nominal liabilities on the basis of the term structure of nominal interest rates (based on European swap rates) published by the Dutch Central Bank. This market-based valuation method, introduced in 2007, thus assumes that nominal liabilities are guarantees.⁵ Before 2007, pension funds discounted their liabilities against a fixed discount rate of 4 percent. The introduction of valuation on the basis of market interest rates did not have a substantial effect on funding rates at the time, as market interest rates in 2007 were close to 4 percent.

Strengths of Dutch Occupational Plans

This section explores the main strengths of Dutch occupational pension schemes compared to mainstream DC schemes.

Advanced risk management and protection against behavioral biases. Workers in the Netherlands are automatically enrolled in pension plans, which reduces marketing and other transaction costs, and protects individuals against myopia and other behavioral biases. Such cooperative pension plans allow individuals with limited financial capabilities to delegate complex saving, investment, payout, and insurance decisions to professionals. In fact, the plans assist individuals to properly exploit their long-run investment horizons and to gain access to complex investment strategies at low costs.

Pension funds also manage interest-rate and inflation risk, seeking to realize their ambition to index retirement income to wages and/or prices. Hence the hedge portfolio is defined in terms of income streams during retirement. Indeed, the main risks (e.g., investment risk, inflation risk, and interest-rate risk) are managed so as to hedge risks on behalf of households while at the same time exploiting the risk premia on various risk factors by optimizing the trade-off between return and risk. This asset-liability management thus results in liability-driven investment. More sophisticated, illiquid, and long-term investments by institutional investors help to stabilize financial markets and facilitate macroeconomic stability.

Protection against agency issues. The board of trustees of a Dutch pension fund contracts out several financial services to asset managers and other providers of financial services. Accordingly, with the employer as a distribution platform, competition occurs on a wholesale level rather than a retail level. By joining forces in a professionally run cooperative pension fund, workers in effect strengthen their buying power in financial markets and markets for financial services. This also permits them to exploit scale economies and discipline commercial financial service providers to act in the interests of pension fund members, who tend to lack sufficient expertise to contract complex financial services.

Pooling of idiosyncratic longevity risk and completion of financial markets. In addition to addressing agency and governance issues, Dutch pension funds reduce selection in longevity insurance through compulsory risk pooling. This facilitates the pooling of idiosyncratic longevity risk, thereby reducing the costs of providing lifetime income streams. Collective risk-pooling not only combats adverse selection in insurance of idiosyncratic longevity risk, but it also allows fund members to trade systematic risks that are not (yet) traded in financial markets. In particular, young members can share in systematic longevity risks faced by older cohorts. To illustrate, if a cohort lives longer than expected, the resulting lower funding rate harms the indexation of the deferred annuities offered to younger cohorts. Moreover, by linking pension benefits to the wages of workers, pension funds allow retirees to share in the wage risks of workers.⁶

Weaknesses of Dutch Occupational Plans

Next, we explore the major weaknesses of Dutch occupational pension plans, which were exposed by the financial crisis. They relate to the legacy of a DB design with external risk sponsors. A first weakness involves the risk profiles of retirement income. In particular, funds' investment policies do not originate from participants' desired risk profiles. That is, the pension contract does not allow much scope to tailor the risk profile to the needs of different generations. A second main weakness concerns the valuation of pension rights. This valuation is based on the fiction of guaranteed pensions, even though pension funds in fact offer variable annuities whose actual value depends on investment policy, funding rates, and the rules for distributing surpluses and deficits. Next, we investigate how the ambiguity surrounding risk profiles and valuation gives rise to intergenerational conflicts about the investment profile of the fund and the ownership of the assets.

Ambiguous risk profiles and liabilities for communication and investment.

Lack of risk-bearing capital. As the ratio of pensioners to workers rises due to aging and the maturation of pensions system, pension liabilities have increased compared to the premium base. As a direct consequence, large changes in contributions are now required to absorb the risk of mismatch between assets and liabilities. Indeed, for many companies, the risks of their DB pension schemes have started to dominate those of the core business. These firms therefore no longer wish to underwrite the risks of their pension funds. Another reason why contributions can no longer absorb shocks is that contribution rates to occupational pensions have reached rather high levels due to low interest rates, increased longevity, and additional recovery contributions aimed at reducing funding shortages (Figure 12.1). Moreover, volatile contributions that are inversely related to the funding rates of pension funds impact the economy in a pro-cyclical fashion. As a result of these developments, employers and workers supply less risk-bearing capital to pension funds in the form of contributions that stabilize funding rates. Accordingly, participants must supply more risk-bearing capital through pension rights that absorb mismatch on the balance sheet of pension funds. Participants rather than contributors have, in fact, become the residual risk bearers of pension funds.

Figure 12.1 here

Substantial mismatch risk due to macroeconomic shocks. Pensions funds' increased financial risks became quite apparent during the financial crisis, which generated a substantial mismatch between the funds' assets and liabilities. Figure 12.2 displays the development of the average nominal funding rate of Dutch pension funds during the last 25 years.⁷ Prior to the onset of the financial crisis in 2007, the average nominal funding rate amounted to about 145 percent. The financial

crisis in 2008 caused the average nominal funding ratio to decrease substantially to a low of about 90 percent in the first quarter of 2009.

Figure 12.2 here

Three main factors contributed to the fall of funding rates. First, in combination with the use of the term structure of nominal interest rates to compute the value of nominal liabilities, the sharp decline in nominal interest rates during the financial crisis boosted the present value of nominal pension liabilities. Indeed most of the decline in the funding rate between 2007 and 2011 can be attributed to lower nominal interest rates. The second factor behind the drop in funding rates was lower mortality. Following major healthcare reforms in 2001, retirees' mortality rates dropped more substantially than anticipated. Upward revisions of life expectancy have depressed average funding rates by about 5 percent. The final factor affecting funding rates involves the asset side of the balance sheet. In particular, the worldwide collapse of share prices in the immediate aftermath of the financial crisis reduced asset values dramatically.

The rise in pension liabilities as a result of lower interest rates was not sufficiently compensated by the increase in the value of bonds (or interest derivatives) on the asset side of the pension balance sheet. This was because the funds did not fully hedge nominal interest-rate risk after the 2007 move to employ nominal interest rates in computing liabilities. On average, Dutch pension funds hedge only around 45 percent of the nominal interest rate risk on their liabilities through positions in nominal bonds and interest derivatives. Moreover, there is substantial heterogeneity in the degree to which funds have hedged interest rate risks. Additionally, funds differ in how they define their liabilities for their own risk-management purposes, even though the public supervisor uses the construct of nominal guaranteed liabilities to compute funding rates. In particular, in the face of fluctuating (wage) inflation expectations, funds must choose which kind

of income liability to hedge: either a nominal pension benefit or a (wage) indexed pension income stream. In particular, short-term debt instruments allow funds to take advantage of rising nominal interest rates if wage inflation expectations increase so as to protect the real value of pensions. This investment policy, however, leaves the fund vulnerable to the risk that falling nominal interest rates will worsen the nominal funding rate, necessitating a cut in nominal pension rights. In the aftermath of the financial crisis, this tension between hedging *nominal* and *real* liabilities has become especially stark, depending in part on whether one believes that changes in nominal interest rates are primarily driven by changes in real interest rates, or by changes in expectations about inflation and the inflation risk premium.

As regards investment risk, various funds have also taken rather different decisions. Indeed, supervisory authorities do not force pension funds to match their nominal liabilities if capital buffers become low.⁸ The supervisory rules thus leave substantial discretion to the pension funds on how to respond to low funding rates in terms of their investment risk. Some pension funds chose to defend nominal pension rights by not only matching these nominal obligations through hedging nominal interest-rate risk but also by cutting back on investment risk. Other pension funds, by contrast, continue taking investment risk in order to retain upside potential.

Insufficient scope for tailor-made risk profiles gives rise to intergenerational conflict. The trade-off pension funds face in setting their investment policies can also be regarded as a trade-off between the interests of young and old participants. As many authors advocating life-cycle investing have shown (e.g., Bodie et al. 1992; Cocco, Gomes, and Maenhout 2005), taking substantial investment risk is more attractive for young participants than for retirees. Similarly, protecting nominal guarantees by hedging nominal interest rate risks is primarily in the interest of the elderly. The current Dutch occupational pension plans impose uniform investment and

adjustments in pension rights (indexation and cuts in nominal pensions) for all participants. This limits the scope to attune risk exposure to the needs of various cohorts (Ambachtsheer 2013), although intertemporal smoothing of shocks allows for limited age differentiation between the risk exposures of various generations (Boelaars et al. 2014). The limited scope for tailor-made risk profiles may lead to suboptimal risk profiles and result in intergenerational conflicts over the investment policy of the pension funds.

Nominal cuts of pensions in payment due to materialized interest-rate risk. Many pension funds that had deliberately chosen to continue to take mismatch risk at low nominal funding rates saw their nominal funding rates fall below 100 percent when interest rates sank during the financial crisis and the subsequent Euro crisis. Most of these pension funds were unable to recover from their funding shortage within the maximum period of five years without cuts in nominal pension rights, including pensions in payment.

The biggest wave of cuts in pensions in payment occurred in 2013: in that year, 68 pension funds (of 415) were required to cut nominal pension rights. These cuts affected around two million active participants (who pay contributions), 1.1 million retired participants, and 2.5 million inactive participants who neither paid contributions nor received benefits.⁹ Figure 12.3 shows a bar chart displaying the size of pension cuts. Around two million participants faced a relatively large cut of six or seven percent. A cut of seven percent is observed frequently because the Dutch government allowed pension funds to cap the level of pension cuts in 2013 at seven percent and defer the remainder to 2014.¹⁰

Figure 12.3 here

Most pension funds have been unable to provide (full) indexation in recent years. Table 12.1 illustrates that actual indexation to retirees has lagged indexation ambitions: on average, retirees

have experienced a decline of around 10 percent of their replacement rates as a consequence of inadequate indexation. This decline is expected to grow because the current low funding rates will not allow pension funds to provide full indexation in the near future.

Table 12.1 here

Inadequate communication about risks profile. Pension funds in the Netherlands typically communicate to participants in terms of nominal pension rights, but they are rather silent on future indexation prospects and the possibilities of future cuts in nominal pension rights. Communication to participants has thus not yet adapted to the new reality of participants being the main risk bearers.¹¹ Hence the fact that pension payouts could be cut came as an unpleasant surprise to many pensioners and eroded the confidence of active members. Table 12.2 shows that the percentage of people expressing ‘some or a lot of trust’ in pension funds declined from 64 percent before the crisis to 42 percent after the crisis.¹²

Table 12.2 here

Pension funds aren’t ‘walking their talk’: incomplete investment policy. The cuts in pension payouts have made it clear that the pension contract does not provide guarantees, even though pension funds continue to communicate in terms of nominal pension rights. Indeed, pension funds do not ‘walk their talk’. Whereas they suggest that they supply fixed annuities, they actually provide variable annuities because they continue to deliberately take mismatch risk at low funding rates in the absence of the possibility to raise contributions to make up funding deficits. The financial crisis thus exposed a major weakness of the Dutch pension system: the ambiguity of the risk profiles of future pension payments on account of incomplete investment policy, and a mismatch between the communicated risk profile and the funds’ investment policy. In particular,

risk profiles are not specified and communicated *ex ante*, and supervisory authorities do not force pension funds to make their investment policies consistent with their communicated risk profiles.

To address this weakness, pension funds would have to change their ways. One solution ('do what you currently say' or 'walk your current talk') would imply a so-called 'combination-contract' in which there is a 'base' level of guaranteed pension payments and a remainder that is conditional on performance.¹³ A combination-contract, which involves both debt-like and equity-like claims, would require solvency rules to force pension funds to defend the guaranteed part of obligations through dynamic investment policies reducing investment risks and interest-rate risks at low funding rates.¹⁴ A second solution ('say what you currently do' or 'talk about your current walk') would change the funds' communicated liability structure by communicating that all pension rights have become uncertain in a particular statistical sense.

Lack of economic valuation and fair pricing: ambiguous property rights.

Lack of economic valuation. Valuation of pension rights in the Netherlands is still based on an outdated DB design, which opens the door for a non-transparent redistribution of wealth across various stakeholders. In particular, pension rights are valued as guaranteed nominal annuities, rather than variable annuities resulting from the funds' investment policies in combination with the withdrawal of external risk bearers. By contrast, an economic valuation of pension rights would take into account the option value of individuals' claims on collective buffers. These conditional claims depend on the rules for distributing surpluses and funding shortages across stakeholders. Next we explain how the lack of economic valuation (and thus fair pricing of pensions entitlements) leads to ambiguity about ownership rights when the pension contract and investment policies are changed, or if annuity units are bought and sold.

Incomplete pension fund policies. A necessary condition for determining the economic value of individual property rights is that the pension contract must be complete, in the sense that the rules for distributing risk are known in advance and are not subject to discretionary changes. Yet most pension contracts do not offer transparency *ex ante* about the rules for allocating the mismatch risk on the balance sheet of pension funds across stakeholders *ex post*. Although, pension funds have recently strived to make risk-sharing contracts more complete, these contracts usually offer little more than guidelines for the governing board. Indeed, the pension governing boards still retain substantial discretion in redistributing resources across stakeholders. For example, most contracts tend to stay silent on what happens in the situation of a funding deficit. It is also unclear what happens if the buffers rise above the levels necessary to fully finance indexed pensions. Discretionary decision making by pension fund boards may alter the value of individual annuities and thus redistribute wealth positions across stakeholders, if the different variable annuities produced by a change in distributional rules or investment policy are not exchanged at fair prices (see also Kocken 2012). This politicizes decision making in pension funds.

Incomplete government policies. In addition to pension fund board discretion, the policies of the government are another source of ambiguity about the distribution of risk and thus the economic value of pension ownership rights. The Dutch government regularly adjusts the rules for pension funds and thereby alters how mismatch risk is allocated across stakeholders. If the original and new variable annuities as a result of a change in government policy are not exchanged at fair prices, the government in effect redistributes economic value across participants.

The discount rate is particularly important in allocating the distribution of resources across stakeholders, because it determines the financial position of a pension fund. This in turn determines pension payments to retirees in the short run, and also the resources remaining for pension

payments in the long run. Starting in 2007, discounting was no longer based on a fixed discount rate of 4 percent but on the term structure of nominal interest rates. This new discounting method caused the funding position to be highly sensitive to changes in nominal interest rates. The low interest rates during the Euro crisis led to proposals for a more stable discount rate. The current valuation method is also controversial because it is still based on guaranteed nominal annuities. Alternative valuation methods have been proposed that aim to provide a better representation of the risk characteristics of the variable annuities that are actually being provided. A key property of these proposals is that they all embody reduced sensitivity to fluctuations in interest rates. Proponents of these alternative valuation methods argue that fluctuations in the risk-free rate are less relevant for the valuation of variable annuities, so that the price of new annuities should be less sensitive to time-variation in the market price of certainty as reflected in interest rates of safe assets (SER 2013).

In 2012, the Dutch government adopted the so-called ‘Ultimate Forward Rate’ (UFR) method for discounting liabilities with long maturities discussed in Solvency-II proposals. The introduction of UFR with fixed annuity units led to an instantaneous three percent increase in the funding rate of the average Dutch pension fund. Improved finances have allowed the pension funds to provide more indexation or reduce the size of required pension cuts.¹⁵ Hence the introduction of the UFR methodology shows how adjustments in regulation can lead to redistribution of market value across stakeholders. Another example of an adjustment in government regulation is the 2008 temporary increase in the maximum number of years that pension funds are allowed to be underfunded, from three to five years. Frequent changes in the rules for computing and distributing mismatch risk have led to intergenerational conflicts and politicized pensions.

To minimize political conflicts, the Dutch government has asked CPB (an independent government body for economic policy analysis) on several occasions to calculate the redistributive effects between generations that result from proposed changes in regulation (CPB 2012a, 2012b, 2013). CPB applied generational accounting to calculate the change in the value of pension rights. These calculations employ stochastic discounting of projected stochastic cash flows instead of valuation based on nominal guarantees.

Intergenerational conflict about investment policy due to asymmetric contract. A valuation based on guaranteed nominal annuities, which the pension funds currently report, fails to recognize that the economic value of individual annuities depends on the pension fund's investment policy. In particular, the relatively short recovery period of five years for a funding shortfall implies that the downside risk associated with risk taking is allocated primarily to the older generations. The upward potential, by contrast, is used to build up collective buffers, which primarily benefit the younger generations. With the old in effect providing a put option to the young participants, an intergenerational conflict emerges about the investment profile of the fund. The old will seek to hedge nominal interest rate risk and reduce investment risk, the young will prefer to take more interest rate and investment risk in order to increase the economic value of their pension entitlements. Due to this asymmetry in the current pension contract (another legacy of the DB approach), in order to protect the value of individual property rights, one should make the contract complete in terms not only of distributional rules but also investment policy.

Non-transparent redistribution when selling and buying annuity units. The lack of fair pricing of annuity units due to inadequate valuation leads to redistribution of wealth if annuity units are bought and sold. In particular, failure to conduct economic valuation of pension rights implies that transfers of pension rights across funds may hurt either those who transfer the rights or the

remaining participants. This distorts decisions to transfer value across funds. Moreover, since the price charged for new pension rights does not reflect the economic value of these rights, the accumulation of new pension entitlements by workers causes non-transparent redistribution between retirees and inactive participants, on the one hand, and workers who are accumulating new (deferred) annuities, on the other. This problem has worsened due to another legacy of the DB schemes: a fixed accrual rate for newly accrued entitlements. A fixed accrual rate implies that the economic costs of pension accruals vary over time as a result of fluctuations in the price of the annuity units. With fair prices, this system of a fixed accrual rate independent of the price of the accrued annuity units is pro-cyclical because the price of annuity units tends to be high in recessions (with low interest rates) and low in booms (with high interest rates). To prevent such pro-cyclicality, the present Dutch system allows for smoothing of the price over time but this leads to non-transparent redistribution between existing participants and active workers. The pro-cyclicality could be mitigated without these value transfers, either by moving to a more stable discount rate (as proposed by SER 2013) or by employing variable accrual rates that fluctuate inversely with the price of the annuity units.

Difficulties in introducing elements of individual choice. With risks increasingly being shifted onto participants, interest has grown in giving individuals a greater say in how much risk they want to bear. However, inadequate valuation hinders the introduction of more elements of individual choice, not only in risk profiles but also contribution levels. In particular, individual choices will be distorted as a result of inadequate valuation.¹⁶

Characteristics of DA Plans

The weaknesses of Dutch occupational DB plans, which became more apparent in the aftermath of the financial crisis, led to proposals to address these weaknesses through the introduction of so-called DA schemes. In this section we describe key features of DA plans, and also explore how these schemes address the shortcomings of DB contracts, and protect the desirable features of traditional occupational schemes described.

Employer as distribution platform for annuities rather than as risk sponsor. DA schemes are similar to DC plans in that they both lack outside risk sponsors: mismatch risk on the fund balance sheet is borne by the participants of the scheme rather than a corporate sponsor. Participants can thus trade risk with outsiders only through tradable financial instruments. This is in the interest of workers for two reasons: first, workers are not exposed to their employer's or industry's credit risk. This is an important advantage because the expected lifetime of firms and industries is declining in the face of ever-more dynamic and competitive economies. Second, by relieving firms of their role as risk sponsor, workers keep firms involved as a distribution platform for occupational pensions. In this way, employers can continue to help address the behavioral factors, agency issues, and the imperfections of insurance and financial markets identified above.

Pension entitlement as (deferred) annuity. Pension entitlements in the DA environment are defined in terms of deferred annuity units (i.e., lifetime income streams beginning at a particular retirement age). Conversion of capital into annuities occurs when contributions are paid, so participants share idiosyncratic longevity risk within the fund's insurance pool. DA schemes thus preserve the advantage of current Dutch contracts in which collective risk-pooling combats selection in longevity insurance.

Risk-sharing with complete contract in mutual insurer yields variable annuities. Participants in DA schemes also share the systematic risks associated with joint asset and liability pools on the basis

of complete contracts. In particular, if the value of the fund's aggregate liabilities deviates from the value of aggregate assets, the pension contract specifies how annuity units will be adjusted over time so that the aggregate value of individual pension rights continues to match the value of the assets in the fund. The fund can thus be viewed as a stand-alone mutual insurer: all risks within the collective are allocated to plan members, so there is no residual balance sheet risk left to outside shareholders or sponsors. Risk-sharing within this fund thus results in variable annuities: annuity units vary with financial and biometric risks in the common asset and liability pools.

Fund liabilities may also include other non-traded risk factors such as (wage) inflation risk.¹⁷ In this way, participants hold claims on notional assets that are not traded in financial markets. DA contracts thus preserve the benefit of traditional collective occupational pension schemes, in that they allow participants to exchange systematic risk factors which are not externally traded.

Innovation in occupational pension schemes. The DA model with variable annuities also offers an innovation in the area of funded occupational pension schemes, just as non-financial defined contribution (NDC) schemes did for pay-as-you-go public schemes (Holzmann, Palmer, and Robalino 2011). In particular, by replacing DB schemes where corporate risk sponsors absorb risk, both NDC and DA schemes lack external risk sponsors; here, in fact, funding gaps do not affect contribution levels. Both of these schemes allocate risk of joint asset and liability pools across participants on the basis of complete contracts that specify how liabilities must be adjusted if the value of aggregate assets deviates from the value of aggregate liabilities.

Specific forms of risk-sharing contracts. The mechanism for allocating mismatch risk in proposed Dutch DA contracts involves some specific features. First of all, the contract is symmetric, so positive shocks in funding are allocated in the same way as are negative shocks. Second,

proportional adjustments of annuity units are uniform across individuals, which imposes restrictions on participants' risk exposure. Annuities are all variable, varying with the financial and biometric risk of the common asset and liability pool. Third, income streams provided by the variable annuities are adjusted gradually after an unexpected shock causes a mismatch between assets and liabilities. Accordingly, retirees do bear investment risk but they have some time to adjust their standards of living after an unexpected event. Such smoothing of adjustment of consumption to shocks is consistent with habit formation.

Communication and risk management on basis of consumption frame. Pension rights are communicated not just in terms of capital, but also in terms of the risk profile of an income stream in retirement. In particular, the pension contract specifies how sensitive real income in retirement will be with respect to the various risk factors. These risk profiles for each horizon are the starting point for risk management (Figure 12.4), and specifying this risk profile is the main responsibility of the pension fund board. The fund's investment policy is then determined endogenously such that the risk surrounding projected pension payments matches desired risk profiles. In this way, the idea of liability-driven investment based on asset-liability management familiar from DB schemes is generalized to stochastic liabilities with risk budgets. In this way, the contract is complete not only in terms of the allocation of mismatch risk across participants, but also in terms of investment policy, so that participants obtain the risk exposures that have been communicated to them. Pension funds 'walk their talk': assets match liabilities.¹⁸ The desired liabilities discipline the investment policy.

Figure 12.4 here

As a result of employing a consumption frame for risk management, interest rate risk is actively managed during both the accumulation and payout phases. In addition, contribution levels can be

set so as to reach a particular goal for retirement income. In this regard, we can distinguish between a DC scheme which fixes the premium, and a DA scheme which adjusts the premium level so as to attain a particular objective for retirement income.

Economic valuation. Economic valuation of individual property rights over annuity units can be derived endogenously from the stochastic pension promises (i.e., the pension ambitions), which represent the liabilities of the DA scheme. In particular, the deferred stochastic annuities provided by the DA scheme are priced on the basis of the term structure of interest rates amended by a horizon-dependent risk premium that rises with the investment horizon, as illustrated in Figure 12.5 (see Bovenberg, Mehlkopf, and Van Bilsen 2014).

Figure 12.5 here

Non-traded risk factors in the common liability pool complicate valuation, since the DA schemes cannot be valued objectively on the basis of prices in financial markets. This gives rise to a trade-off between completing financial markets versus being able to make an objective economic valuation. On the one hand, these schemes allow participants to trade risk factors among themselves that are not yet traded on financial markets, thereby potentially creating value. On the other hand, the prices of these risk factors are difficult to determine objectively, which may give rise to political risk.

The symmetric nature of the pension contract implies that the investment policy of the fund does not affect the market value of individual pension rights for given annuity units (see Bovenberg, Mehlkopf, and Van Bilsen 2014). The separation between risk exposures and the value of the individual annuities allows trustees to change the risk profile of given annuity units without changing their value. In this way, DA, pension funds may be allowed more discretion to modify risk profiles.

Proper valuation is needed to give participants some limited freedom of choice in selecting their own risk profiles or saving levels. In particular, by allowing participants to exchange various types of variable annuities at fair prices, pension funds can provide individuals discretion in selecting their own risk profile and contribution level without imposing externalities on the other participants of the fund.

Market-consistent valuation is also relevant for determining the prices for buying and selling the annuities that do not impose externalities on existing owners of annuity units. In particular, required pension contributions can be derived endogenously from the stochastic pension promises (i.e., the pension ambitions). This is reminiscent of traditional DB schemes in which the pension contributions are determined on the basis of the guaranteed income stream during retirement. Similarly, the value of the variable annuities can be determined in the DA context when individuals want to transfer their pension rights to another pension fund.¹⁹ This avoids distortions.

Economic valuation also helps protect property rights and generational fairness when the risk-sharing contract is changed. In particular, the value of property rights should remain constant if a change in the pension contract implies that participants may exchange one type of variable annuity for another. Exchanging variable annuities at fair prices avoids mixing up a change in the pension contract with intergenerational redistribution. This condition of neutrality in market value in case of contract changes allows one to value the contract on a market-consistent basis, even though the contract is incomplete in the sense that it may be changed over time in the face of new information. To illustrate, a single annuity may be transformed into a joint-and-survivor annuity, leaving the total value of the pension right unaffected. Another element that may be subject to change is the way in which discount rates and hence liabilities are computed. In particular, how sensitive the discount rates should be to the nominal interest rate is a controversial issue, and

pension funds may differ in how they want to define liabilities. By enforcing fair pricing when the definition of the liabilities changes, supervisors can allow pension funds more discretion in how the funds define liabilities.

It is debatable as to whether changes in the way discount rates are computed should lead to intergenerational distribution. It could be argued that changes in the discount-rate methodology set by the government, based on an advice from experts, should lead to similar intergenerational risk-sharing as when interest rates change (at given annuity units). To illustrate, a higher assumed risk premium (at a given risk) raises expected future rates of return and thus reduces the current cost of funding an uncertain future pension with a given expectation. The pension contract thus allows generations to share risk factors that are not traded on financial markets (namely, the subjective estimates of experts on the equity risk premium). But allowing changes in the estimated risk premium to redistribute market value across generations may well lead to intergenerational conflicts about the unobservable risk premium. Moreover, pension funds cannot hedge discretionary changes in the assumed risk premium.

Current Status of Pension Reform in the Netherlands

In the Dutch pension agreement of 2010, social partners (i.e., the unions and the national association of employers) proposed moving towards DA-type contracts in occupational pensions. The goal was to allow pension income to adapt to unexpected changes in life expectancy and returns on financial markets. In this way, unexpected biometric and financial shocks would be absorbed in pension rights (i.e., annuity units) rather than in additional contributions from employers and workers. The move towards DA contracts provided risk-bearing capital to the pension funds, given employers' withdrawal as external risk sponsors. The goal was to make the

new pension contracts transparent and complete, and to have pension funds communicate the risks implied by the pension contract (including investment policies) to participants. As regards systematic longevity risk, it was proposed that the eligibility age for the public pension and the accrual rate in occupational pensions would both be linked to life expectancy. In particular, the average number of pension years for each generation would be set equal to the average expected pension years for generations who started to collect the public pension between 2000 and 2009.

Government's response. The Dutch government adopted the proposal to increase the retirement age, implementing legislation in 2012 linking the eligibility age for the public pension and the accrual rate for tax-privileged occupational pensions to life expectancy. The eligibility age for the public pension will gradually increase from 65 to 66 during the period 2013–2019 and will be further increased to 67 during 2020–2023. After 2023, this age will be permanently linked to longevity.

The proposals to move towards DA contracts in the funded pension pillar are still under consideration. It is unclear whether the government will adopt the full set of proposals for DA or whether it will only implement rather small changes to current pension structures.²⁰ Three main factors complicate the actual implementation of a DA model and explain why the government is reluctant to adopt DA schemes, namely transitional problems, disagreements about risk profiles and intergenerational conflicts about annuity valuation.

Regarding transitional problems, the proposal anticipated that the new contracts would apply not only to newly accrued pension rights, but also to existing pension rights. Yet this retrospective change in pension contracts could be challenged in court. The Dutch government is reluctant to take on these legal risks and is therefore unwilling to mandate a wholesale conversion to DA contracts. Instead, it advocates that a choice to retrospectively change the pension contract

would be the responsibility of the pension funds, and many smaller pension funds fear possible legal risks, though some larger sectoral funds seem willing to accept them.

Two factors complicate the conversion of existing ‘DB’ rights into ‘DA’ rights, and they make the outcome of court cases uncertain. First, individual property rights under the current contracts cannot be valued objectively because the contracts are incomplete. Among other things, the economic value of pension rights depends on the portfolio mix because of the asymmetric nature of pension contracts. For this reason, it is not so clear who would gain and who would lose from a transition to DA. Second, the risk profile under current contracts is ambiguous and not clearly specified, nor has it been communicated *ex ante*. Accordingly, the extent to which the move toward DA changes the risk profile of pension entitlements is unclear. If existing pension rights were interpreted as guarantees, then the move towards DA contracts could be viewed as a debt-equity swap. But as explained above, most pension funds do not match nominal liabilities in their investment policy even though they lack external risk sponsors. For this reason, nominal pension rights are in fact already risk-bearing.

The proposals for DA contracts have also led to heated discussions about the desired risk profile of pension payments. To illustrate, the extent to which pension funds should offer nominal guarantees is controversial. On the one hand, some people argued that guarantees should not be provided, because real guarantees cannot be purchased (the supply of safe inflation-linked bonds is very limited in the Euro area) and are too expensive, especially for workers. On the other hand, some argued in favor of including some form of nominal guarantee to offer some certainty, which also makes the pension product easier to communicate. Moreover, the funds’ investment policy can also be better disciplined. Some proponents of the second view denounced contracts without

guarantees as ‘casino pensions.’ At the same time, those who supported nominal guarantees were accused of exploiting participants’ money illusion.

A third explanation for why DA plans have not yet been adopted has to do with the combination of the subjective and unstable character of the contracts, and the legacy of the traditional DB mindset with fixed annuity units. In particular, fair pricing is difficult to adopt when the contract (including the discount methodology for computing liabilities) is changed, because then the number of annuity units would have to change.²¹ With fixed annuity units, however, a change in the pension contract (including the discounting methodology) results in redistribution of wealth across participants and therefore yields intergenerational conflicts. The experience of the last couple of years shows that smoothing periods and discount rates are, in fact, changed frequently. Some argued that economic valuation under DA would reduce political risks, by increasing transparency about intergenerational redistribution associated with changes in the contract. Others, by contrast, maintained that the discount methodology in DA contracts might be changed even more frequently because the risk premium and expected inflation in the discount rate are difficult to estimate. For this reason, DA contracts might give rise to even more intergenerational conflict than the current DB contracts. Concerns about political risk intensified when the social partners proposed employing the expected return on the portfolio of pension funds as the discount rate for calculating pension liabilities. Critics pointed out that using the expected return as discount rate would result in intergenerational redistribution from older to younger participants, if pension funds were to raise their expected return by investing in riskier assets while not raising the annuity units for young participants.

Market pricing of a variable annuity is hard to adopt because of the legacy of DB thinking in terms of fixed annuity units, not only when contracts are changed but also if new annuity units

are bought. Social partners seek to maintain a fixed annual accrual rate (in terms of annuity units) even though they are unwilling to tolerate fluctuations in the contribution rates as a consequence of changes in the economic value of the annuity units. The goals of stabilizing both accrual rates and contribution levels have led to heated discussions about the interest sensitivity of the discount rate. The social partners argued that discount rates should be more stable than nominal interest rates, to ensure that the interest sensitivity of contribution rates does not affect the economy in a pro-cyclical fashion. The discounting methodology debate together with an unwillingness to modify either the fixed accrual rate or annuity units when the discounting methodology is changed has intensified concerns about political risks surrounding DA contracts.

Companies are considering individual defined contribution. Other proposals for pension reforms look beyond DA and focus instead on individual accounts in which entitlements are defined in terms of claims on tradable financial assets without joint liability pools that are difficult to value (see PJO 2013 and WI CDA 2014). Several large companies who operate their own pension funds have lost patience with the slow reform process, and they are now considering a move towards individual DC schemes. Here, entitlements would be defined in terms of claims on tradable financial assets in the accumulation phase, while annuities will be provided in the payout phase.²² These companies will continue to play a role as a distribution platform, setting defaults and collectively contracting out a pool of insured participants to the financial service industry. Hence, these individual contribution schemes can retain a collective wrapping.

These individual DC schemes do not rely on fixed accrual rates of deferred annuities and thus they reconcile a fixed contribution level with the absence of external effects on the value of existing pension rights. Other advantages are that property rights are defined in terms of capital rather than difficult-to-value annuities. Hence DC plans are less subject to political risk than are

DA plans. Moreover, DC plans allow for more tailor-made risk exposures because they are not constrained by a uniform definition of liabilities along with the associated discounting methodology, including the interest-rate sensitivity of discounting, prescribed by the government and uniform adjustments of annuity units.

The firms considering a move to a defined contribution plan face three obstacles. First, Dutch tax privileges for individual DC schemes are less generous than those for schemes that define entitlements in terms of deferred annuities. Second, the tax regime is modeled after the fixed accrual rate in DB schemes, which implies that the accrual of pension benefits is backloaded. Hence tax deductible contribution rates are low for young workers and rise sharply with age. Third, legislation stipulates that capital must be converted at retirement into a fixed nominal annuity bought from an insurance company, and guidelines require investment and interest-rate risks to be shut down even prior to retirement. Together with the relatively low contribution rates for young workers, this makes it difficult for workers to benefit from the equity risk premium. These regulations also expose workers to inflation risk. Regulatory changes to allow variable annuities for Dutch DC pensions are currently under consideration.

Lessons of DA for DC Schemes in the United States

This section explores the relevance of DA plans for mainstream DC schemes in the United States. **‘Consumption frame’ during the accumulation phase.** Traditional DC schemes can allow a more conservative portfolio when retirement approaches. In doing so, these schemes recognize that taking investment risk is more attractive for young workers than for older workers and retirees. Nevertheless, they are typically based on a ‘capital frame,’ which fails to recognize the importance of interest-rate management for providing a stable lifetime income stream during retirement.

Indeed, since interest rates affect expected future returns, rational investors should engage in intertemporal hedging. For this reason, DC risk management could be improved if investments can be ‘liability driven’ by adopting the ‘consumption frame’ of DA.

In DC plans, liabilities are used only to conduct individual asset-liability risk management; unlike in DA, liability risks are not shared with others in a mutual insurance framework. An advantage of the individual approach is that one need not confront controversial valuation issues of joint liabilities and the associated political risks (including changing the valuation methodology of the joint liabilities). A disadvantage of not sharing liability risks is that individuals cannot share risks that are not traded on financial markets.

If all risk factors determining the value of liabilities could be traded in financial markets, then a DC scheme that based its investment strategy on a properly defined individual liability could, in theory, mimic the risk exposures of a DA scheme that defines entitlements in terms of annuity units purchased and sold on the basis of fair economic pricing. The practical advantage of the DA model, however, is that the ‘consumption frame’ is inherently integrated in its design because individual entitlements are defined in terms of annuity units, and thus income streams. This contrasts with DC schemes which define entitlements in terms of capital, rather than a consumption frame. As a result of this difference in framing, DA schemes typically feature more advanced risk management with more intertemporal hedging. A disadvantage of the ‘consumption frame’ in DA schemes, however, is that the economic value of individual entitlements may be less well protected in DA schemes than in DC schemes, in which property rights are based on easy-to-value financial assets and thus do not involve controversial valuation methods. In theory, redistributing wealth across individuals can be ruled out in a DA contract if fair pricing were applied in the event that contracts are changed, including the valuation methodology of the joint liabilities. In practice,

however, individual ownership rights may be subject to political risk because annuity units may not be adjusted when contracts are changed.

Managing interest rate risk is complicated for three reasons. First, during the accumulation phase, an investor may not yet know which fraction of wealth he intends to use to buy an annuity (as opposed to a lump-sum payment), and what the desired risk profile of the income stream will be (nominal or real, guaranteed or variable). In this case, it may not be clear which ‘liability’ needs to be hedged during the accumulation phase. Second, if one continued to take investment risk during retirement, the assumed relationship between interest rates and expected returns on risky investments becomes relevant for intertemporal hedging demands. Yet this relationship is difficult to estimate and is subject to substantial model risk. Third, if the aim is to provide an income stream linked to wage inflation in the absence of wage inflation-linked bonds, then the optimal intertemporal hedging strategy in terms of hedging nominal interest-rate risk depends on whether one believes that changes in nominal interest rates are driven primarily by changes in real interest rates or by changes in expectations about wage inflation.

Communication in mainstream DC schemes is typically based on the accumulated wealth (the ‘capital frame’) rather than in terms of a future income stream. Nevertheless, communication in terms of income streams can improve people’s understanding of their financial situation, particularly when it provides information on the uncertainty and purchasing power of future consumption streams.²³

Dealing with longevity risk. Annuitization of pension wealth is mandatory in the Dutch second pillar, as well as for individual DC schemes. The level of annuitization in the United States, by contrast, is relatively low: few retirees voluntarily annuitize their retirement savings. Rational models of risk-averse consumers have difficulty explaining limited annuity demand in view of the

potential for mortality credits (especially at the end of life) to reduce the costs of lifetime income. The DA consumption frame may help boost the demand for annuities. In particular, Brown et al. (2008) show that people value annuities more highly in a consumption frame. In a capital frame, by contrast, annuities are seen as a risky asset because the payoff depends on one's uncertain lifespan. Moreover, annuities can help reduce the costs of means-tested public healthcare because they protect individuals from running out of money at the end of life, when people tend to need care (Peijnenburg et al. 2010).

Individual pension plans also must deal with macro longevity risk. When annuities are bought for the payout phase, systematic longevity risk can be (re)insured by an insurance company. One disadvantage of this solution is default risk of the insurer. Insurance also tends to be costly due to required solvency buffers in the absence of a natural hedge against macro-longevity risk.²⁴ An alternative solution, which does not require insurance by a third party, is mutual insurance with collectively-owned solvency buffers for the purpose of absorbing unexpected shocks in longevity. Examples of mutual insurance companies offering fixed annuities include TIAA in the U.S. and mutual insurers in Scandinavia. A disadvantage of this form of mutual insurance is that the prices for insurance and the property rights of the mutually owned buffer are not well defined, which may give rise to nontransparent redistribution of wealth within the mutual across various parties. Moreover, younger participants may have to bear substantial longevity risk due to mutual insurers having a large number of old participants that must be shielded from systematic longevity risk.

A DA solution for sharing macro longevity risk within a joint liability pool can provide an attractive alternative. Indeed, DA resembles the CREF annuity scheme in the United States, which adjusts the annuity units of its retired participants in response to longevity shocks (including changes in projected mortality). CREF differs from DA in that unexpected shocks are not

smoothed but immediately absorbed in payouts. In view of habit formation, a smoothing procedure in the spirit of DA may be more attractive because it results in gradual adjustment of income streams.

A DA solution with joint liabilities to deal with systematic longevity risk can be restricted to the payout phase. This limits difficult valuation issues, as well as the associated political risks and potential intergenerational conflicts, in the face of substantial uncertainty regarding future retiree mortality. Moreover, workers can absorb changes in remaining life expectancy by working to a later age, whereas retirees cannot. Hence it does not seem to make sense to have retired generations share in workers' systematic longevity risks. One might even want to restrict sharing the risks of joint liabilities to only the oldest cohorts (e.g., cohorts of age 75 and older). In this way, capital is not completely converted into annuity units at the retirement age, and until the age of full annuitization, retirement income comes in part from capital.²⁵ Indeed, longevity insurance is most valuable at old ages when mortality credits are substantial (Scott 2008).

Workers can also insure the macro longevity risk of older participants in the annuity pool if their capital has not been converted to an annuity. This form of intergenerational risk trading may be welfare-improving because workers can exploit their remaining human capital to absorb shocks (Bodie et al. 1992). A disadvantage is that the risk premium workers require to take on longevity risk of the oldest cohorts is not observable in financial markets and therefore may give rise to intergenerational conflicts.

Heterogeneity in terms of life expectancy within cohorts can lead to intra-generational transfers in collective pools that insure longevity risk at uniform prices: for example, transfers from men to women, or from low earners to high earners. If some forms of redistribution between groups with different mortality rates were to be considered undesirable, these could be ruled out

by differentiating prices for annuities based on observed heterogeneity in life expectancy or by forming homogeneous pools. If such transfers were deemed desirable, by contrast, one could employ risk-equalization schemes to reconcile solidarity between groups with free entry in insurance pools.

Variable annuities: smoothing investment risk. Most annuities purchased from accumulated wealth in individual DC schemes currently take the form of guaranteed lifelong income streams. The conversion of wealth into an annuity thus prevents the annuitant from taking advantage of risk premia. DA schemes, by contrast, allow participants to continue taking investment risk after annuitization. Gradual adjustments after unexpected investment shocks protect retirees from large discrete changes in their consumption levels. Smoothing of shocks in effect leads to life-cycle investments beyond the moment of retirement: investment risk is gradually reduced after the retirement age.²⁶ Smoothing and the associated life-cycle investment distinguish DA from most variable annuities in the United States, including the CREF annuities referred to above.

Role of the employer to deal with behavioral and market imperfections. By discharging employers from their role as risk sponsor, DA makes it more attractive for employers to continue to play a role as a distributional platform for occupational pensions. In this way, employers help address (1) behavioral imperfections by setting defaults; (2) agency issues in financial markets by collective procurement of financial services from commercial suppliers; and (3) selection in insurance by pooling longevity risks.

Conclusion: Are DA Schemes Suitable for the United States?

This chapter has explored the strengths and weaknesses of DA pension schemes. In overview, four features of DA hold promise for the United States.

First, the consumption frame used by DA schemes can improve communication and risk management compared to DC schemes. Communication in terms of lifetime income streams may assist individuals to better understand their financial situations. Among other things, it may boost the demand for annuities. Regarding risk management, viewing income streams as liabilities encourages financial providers to engage in better intertemporal hedging.

Second, the DA model addresses systematic longevity risk in annuity provision through risk-sharing within a joint liability pool. Collective risk-sharing does not suffer from the drawbacks of external insurance (i.e., default risk and costly solvency buffers) or mutual insurance with collective buffers (i.e., nontransparent ownership).

Third, the DA approach allows retirees to continue to benefit from risk premia without being subject to large discrete fluctuations in consumption, because of the smoothing mechanism that leads to a continuation of life-cycle investment throughout retirement. This design for variable annuities reconciles insurance of idiosyncratic longevity risk with taking investment risk.

Fourth, DA schemes allow employers to play an important role in addressing behavioral imperfections, agency issues, and imperfections of insurance and financial markets.

Collective DA plans with joint liabilities may be especially useful during the payout phase for DC schemes. To limit valuation problems, risk-sharing of joint liabilities could be limited to the oldest group (e.g., 75 years and older) only.

DA schemes may also be attractive for DB schemes in the public sector, as the latter must reduce risks and costs to taxpayers. Nevertheless, risk-sharing with a common liability pool of retirees and workers can lead to intergenerational conflicts about the contract. Additionally, choosing the discount methodology for valuing joint liabilities can be contentious if annuities are not priced and exchanged fairly in the event the contract is changed or when the annuities are

bought. In any case, the current underfunding of public sector pension funds in the U.S. must be addressed. Framing of entitlements as annuity units results in volatile contributions, unless accruals move inversely with the price of the variable annuities. Moreover, the DA model does not allow for sufficient tailor-made risk management if adjustments of annuity units are uniform across cohorts. For instance, asking retired cohorts to share the longevity risk of the working generations is probably not optimal. Accordingly, a DA plan can be attractive for the payout phase but it holds promise for the accumulation phase only if annuity units are priced fairly, benefit accrual varies with the price of the annuity units, and risk exposure of the annuity units can differ across cohorts.

In sum, for the U.S, a hybrid solution may be attractive. This would employ a DC frame (defining entitlements in terms of capital) during the accumulation phase and a DA frame (defining entitlements in terms of annuity units) during the payout phase. Such a hybrid combines the strengths of individual DC, including individual ownership, actuarially neutral pension accruals, and scope for tailor-made risk management and individual choice, with the strengths of DA, namely insurance of idiosyncratic longevity risk, sharing of systematic longevity risk, and utilization of the employer as a platform for addressing behavioral and market imperfections.

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Endnotes

¹ The analysis in this chapter is descriptive in nature; for a theoretical treatment, see Bovenberg, Mehlkopf, and Van Bilsen (2014), who formalize DA schemes, including the market valuation of variable annuities provided by these schemes.

² In terms of active participants, the other most important type of pension fund is a company pension fund. To provide pension benefits to its workers, a company does not have to set up its own company pension fund but can also contract out its pension scheme to an insurance company.

³ The combination of uniform accrual and a uniform contribution rate in industry funds implies that occupational pensions are in effect financed in part on a pay-as-you-go basis, as younger workers subsidize older workers. CPB (2014) estimates that the implicit debt, due to the backloading of benefits is approximately 10 percent of total assets.

⁴ Several Dutch pension funds had to cut pensions in payments in nominal terms in April 2013.

See below.

⁵ This valuation method was amended in 2012 with the Ultimate Forward Rate (UFR) methodology to determine discount rates beyond a horizon of 20 years. See below.

⁶ In principle, one could share financial market shocks not only between currently living generations but also with generations not yet participating in the pension scheme. From an ex-ante point of view, this intergenerational trade is actually welfare-improving. In practice, however, the scope for such risk-sharing is limited by the ability to commit generations to the contract (see Bovenberg and Mehlkopf 2014). As a result, the welfare gain associated with risk-sharing with future participants is rather limited in Dutch occupational pension schemes (see Boelaars et al. 2014).

⁷ Nominal liabilities in Figure 12.2 are calculated on the basis of the term structure of interest rates,

also before 2007 when pension funds in fact still employed a fixed discount rate of 4 percent to compute their liabilities.

⁸ They do, however, prohibit funds that face a nominal funding shortage taking more mismatch risk.

⁹ These numbers include some double-counting for people who have pension entitlements in more than one pension fund, for example people who are active participants in one pension fund and who are inactive participants in another pension fund (i.e., people who did not transfer their pension wealth when moving to another company or sector).

¹⁰ The wave of pension cuts in 2014 is smaller compared to the year before: 29 pension funds are required to cut pensions. The cuts in 2014 affect around 200,000 retirees, 300,000 active participants and 600,000 participants who neither pay contributions nor receive benefits. The size of cuts is on average 1.3 percent.

¹¹ The government has announced that, starting in 2015, pension funds should communicate to individual participants projected pension incomes in real terms for both the median outcome and a ‘bad weather’ scenario.

¹² The recent cuts in nominal pension rights in 2013 and 2014 were not measured in this survey, and they are likely to have resulted in a further decline in confidence levels.

¹³ At current asset levels and interest rates, nominal guarantees would have to be lower than current pension rights if pension funds would maintain enough upward potential for indexing pension rights to (wage) inflation. Such a ‘debt-equity swap’ would especially necessary for (younger) workers.

¹⁴ Ambachtsheer (2013) contains a proposal for the introduction of a two-fund solution in the Netherlands that is based on a similar idea. In Ambachtsheer’s proposal, young participants start

accumulating wealth in a return-seeking mutual fund with a long investment horizon and gradually convert their wealth into an annuity fund during the life-cycle.

¹⁵ This wealth transfer from workers to retirees through pension payments is partially offset by the impact of the discount rate on the contributions that workers have to pay for new accruals (CPB 2012*b*).

¹⁶ Individual choice in contribution levels is distorted also by the combination of backloading of pension benefits in combination with the uniform pricing of annuities.

¹⁷ The supply of inflation-linked bonds is limited in the Euro area. Moreover, these bonds use Euro inflation rather than Dutch price inflation used by pension funds.

¹⁸ Even though assets match liabilities *ex ante*, liabilities may diverge from assets *ex post* because liabilities are stochastic. Hence, mismatch risk is zero *ex post* only if liabilities are guaranteed (i.e., non-stochastic).

¹⁹ In the present Dutch context, transferring pension rights between pension funds is possible only if workers change jobs. Market valuation, however, would in principle allow workers to select their own pension fund, and hence would allow more competition in pension provision. Drawbacks of this freedom of choice between pension providers are additional transaction and marketing costs as well as less scope for pension funds to benefit from liquidity premia by investing in illiquid assets.

²⁰ These changes would be aimed at making cuts in nominal annuities after adverse shocks in a more gradual way, in order to prevent large abrupt cuts in pensions during economic downturns.

²¹ In the payout phase, one could smooth the adjustment in the annuity units to prevent large discrete changes in income levels.

²² These companies are inclined to close the DB fund for new entrants without converting existing

rights.

²³ This typically requires subjective assumptions about expectations and volatilities of future returns (to calculate future asset values) as well as inflation (to calculate future liabilities). Hence, model risk complicates communication in terms of uncertainty and purchasing power.

²⁴ A more attractive solution may be that the government could issue longevity bonds to cover the tail risk of mortality for the very oldest cohorts, especially if longevity risk on the government balance sheet is limited because the eligibility age for public pension benefits is linked to longevity.

²⁵ To avoid selection issues, one may want to buy the lifetime income stream after age 75 already at age 65. Risk-sharing within a single cohort (i.e., generational accounts or ‘tontine’) may also be possible in large pension funds, but may be problematic at high ages (when the number of surviving participants is small) and the insurance pool is no longer large enough for the ‘law of large numbers’ to hold.

²⁶ Life-cycle investment can alternatively be organized as an escalating annuity that provides nominal guarantees and uses risky investments to provide conditional cost-of-living adjustments (van Bilsen, Laeven, and Nijman 2013). These solutions do not rebalance equities and risk-free bonds after a negative investment shock. An advantage of these schemes is that nominal income never declines on account of investment risk. A disadvantage is that expected bonuses may fall short of expected inflation after an adverse shock.

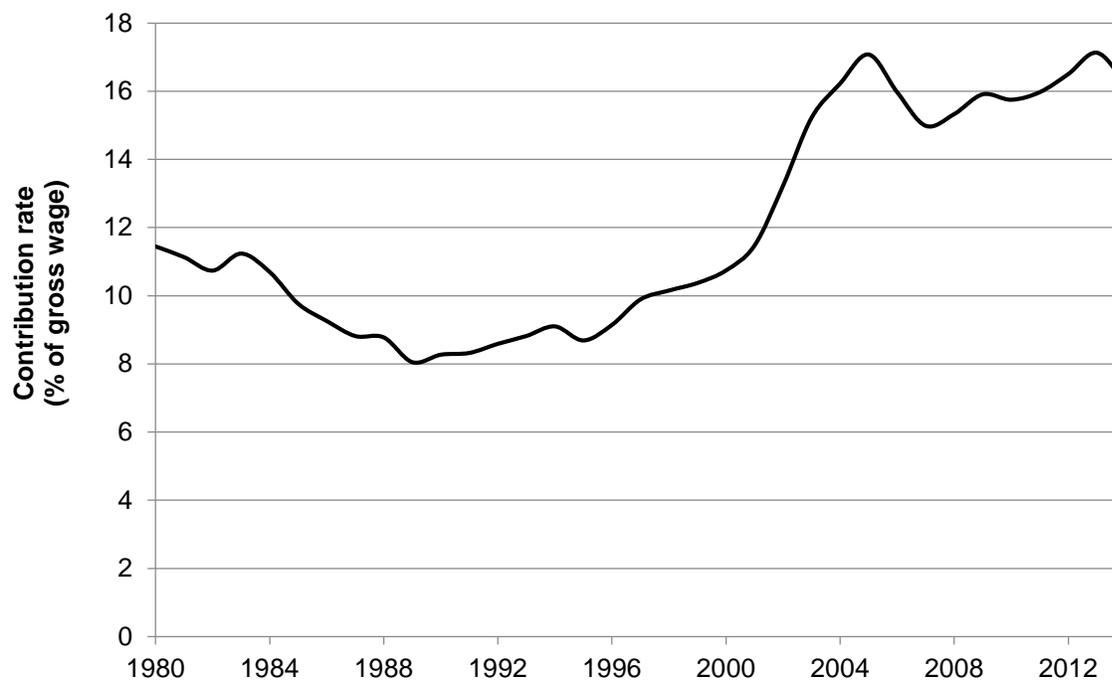


Figure 12.1. Average total (employee plus employer) contributions to Dutch occupational pensions as percentage of gross wage income, 1980–2013.

Source: CPB (2014).

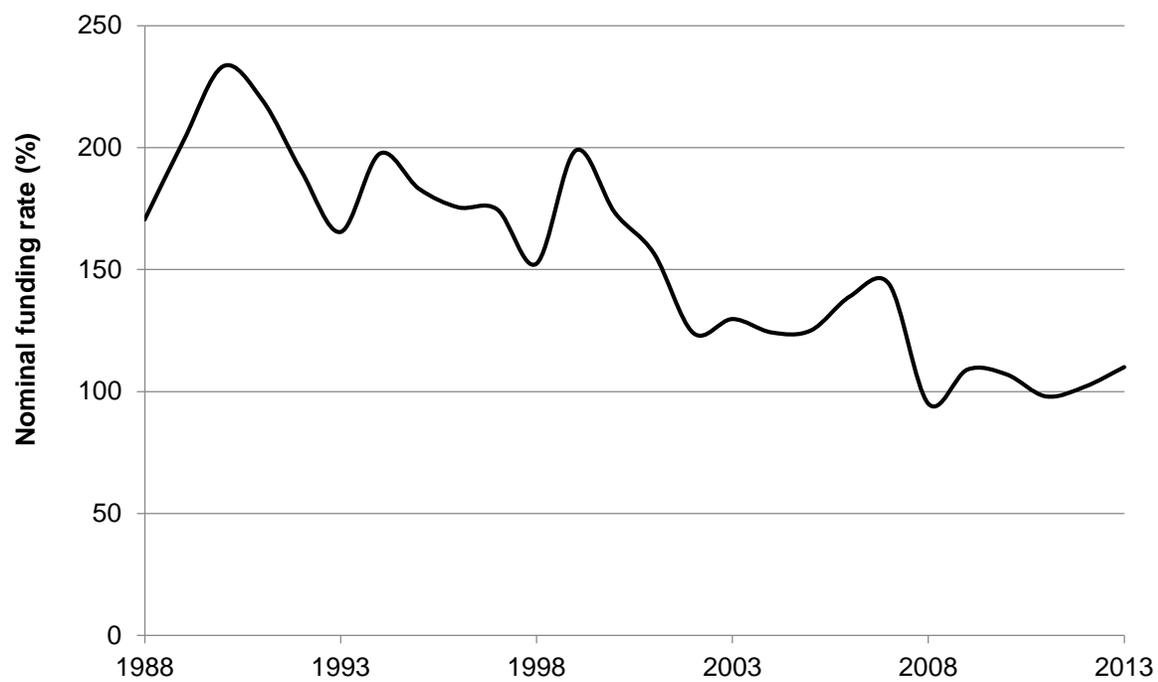


Figure 12.2. Average nominal funding rate of Dutch occupational pension funds, 1988–2013.
Source: CPB (2014)

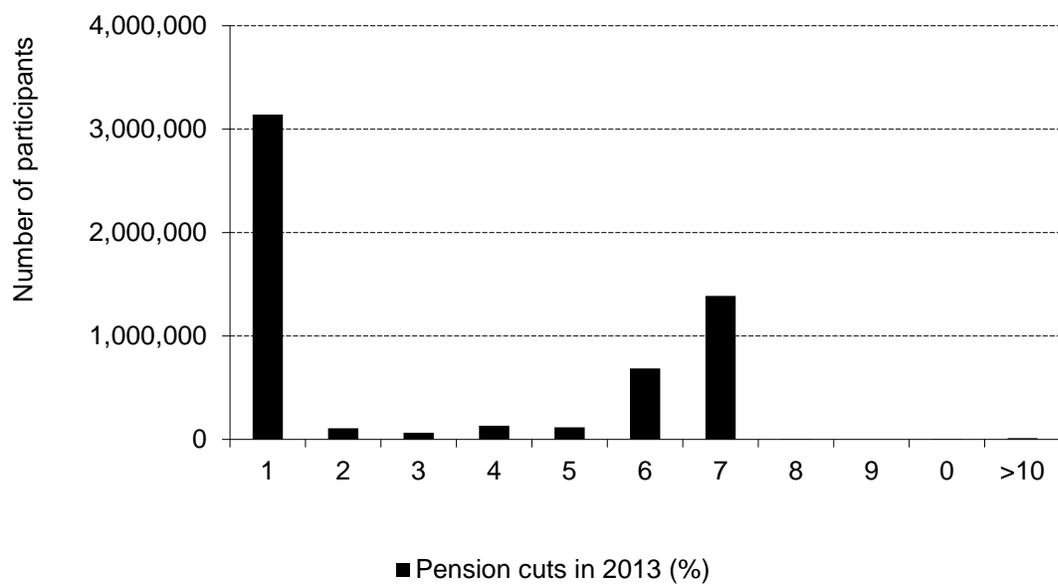


Figure 12.3. Number of participants affected by cuts in Dutch occupational pensions in 2013.
Source: DNB (2014)

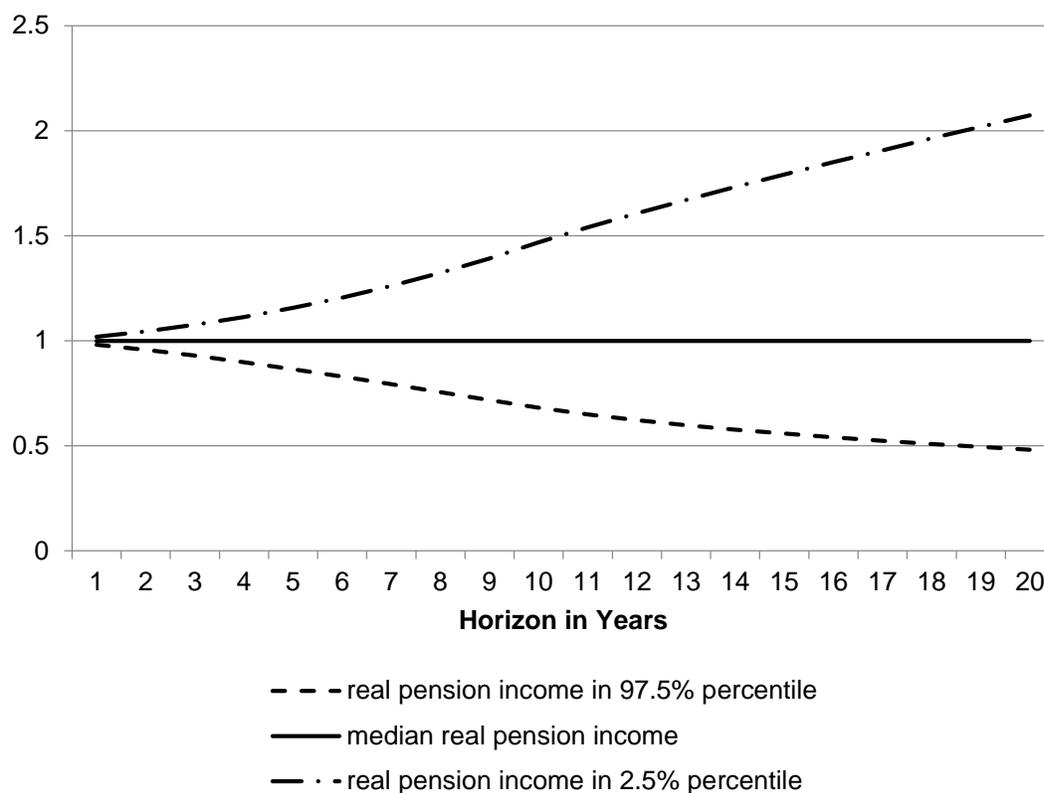


Figure 12.4. Risk profile of future real pension income in DA scheme.

Notes: The mean of real pension income is normalized to unity in this figure. The dotted and dash-dotted lines illustrate real pension income in the 97.5% and 2.5% percentiles, respectively.

Source: Bovenberg, Mehlkopf, and Van Bilsen (2014)

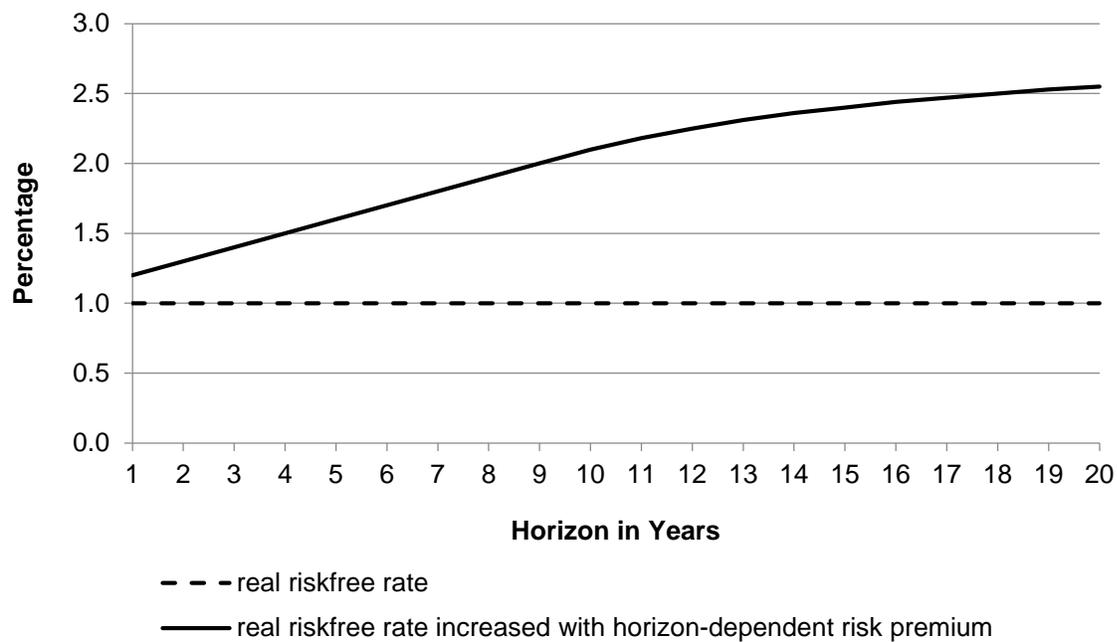


Figure 12.5. Horizon-dependent discount rate of a DA scheme.
Source: Bovenberg, Mehlkopf, and Van Bilsen (2014)

Table 12.1. Average indexation shortfall, 2008–2014

	2008	2009	2010	2011	2012	2013	2014
Indexation ambition	1.84	3.76	1.66	1.2	1.35	1.47	1.11
Actual indexation	2.91	0.17	0.42	0.02	0.02	0.08	0.18

Source: DNB (2014)

Table 12.2. Confidence in pension funds, the government, banks, and insurers (percentage of Dutch people have some or a lot of confidence)

	2004	2006	2009	2011
Pension funds	53	64	44	42
Government	37	42	45	41
Banks	32	37	25	34
Insurers	32	37	18	20

Source: Van Dalen and Henkens (2011)