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## **Frontiers in Pension Finance and Reform: Institutional Innovation in the Netherlands**

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## **Frontiers in Pension Finance and Reform: Institutional innovation in the Netherlands<sup>1</sup>**

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### **Abstract**

Stand-alone collective pension schemes are an attractive third way between the extensive public pay-as-you-go schemes of continental Europe and the individual pension plans that are increasingly replacing defined-benefit plans in the Anglo-Saxon countries. If a number of further reforms are implemented, Dutch pension funds can evolve into stand-alone pension schemes that better fit the needs of employees in a dynamic, innovative economy.

Key words: pension schemes, aging, labor market, human capital

JEL codes: J32, J10, J40, J24

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## 1. Introduction

All over the world retirement systems are under severe pressure. In continental European countries, large pay-as-you-go schemes are vulnerable to aging. Occupational defined-benefit plans in which companies guarantee pension benefits are being phased out in the Anglo-Saxon world. The retreat of governments and companies as sponsors of pension systems calls for institutional innovation in pension insurance.

This paper argues that stand-alone collective pension schemes in which participants share risk among themselves are an attractive third way between the extensive public pay-as-you-go (PAYG) schemes of continental Europe and the individual pension plans that are increasingly replacing defined-benefit plans in the Anglo-Saxon countries. Whereas the large pay-as-you-go systems are not sustainable in light of the demographic trends, individual pension plans suffer from financial illiteracy and associated marketing and other transaction costs.

The Dutch pension system contains strong elements that may be appealing to other countries as well. As the first pillar of the pension system, the public pay-as-you-go system focuses on poverty alleviation by offering a flat benefit. To maintain standard of living in retirement, the second, occupational pillar supplements these minimum retirement benefits. This is accomplished through compulsory participation of workers in occupational pension schemes at a sectoral or company level (for the larger firms). Finally, individuals can voluntarily add to their occupational pensions through personal pension plans in the third pension pillar. This paper maintains that Dutch occupational pension funds can evolve into stand-alone pension schemes that fit the needs of employees in a dynamic, innovative economy.

The rest of this paper is structured as follows. Section 2 describes the challenges faced by the elaborate pay-as-you-go systems in continental Europe and the occupational defined-benefit plans in the Anglo-Saxon countries. It argues that continental European countries should focus their public retirement systems on poverty alleviation by gradually reducing public benefits for those earning higher incomes. At the same time, occupational defined-benefit pension plans in the Anglo-Saxon countries, which offer guaranteed pensions, have become too expensive, while their pension promises often end up being empty. These plans should thus be phased out, as is indeed happening.

With governments and companies retreating as sponsors of old-age insurance, Section 3 discusses the need for institutional innovation to help individuals in financial planning over the life cycle. Individual pension plans suffer from transaction costs as households typically lack the basic financial knowledge and computational ability to implement complex financial plans. Collective stand-alone pension schemes that assist individuals in accessing financial markets and exploiting the potential of complex financial instruments appear an attractive vehicle to offer old-age pension insurance. To illustrate the potential of stand-alone collective pension schemes, Section 4 turns to the case of Dutch sectoral pension funds, which have been evolving in the direction of stand-alone pension funds. This section describes several further reforms that are needed to enhance the sustainability of these stand-alone pension schemes in view of various trends, such as aging and increased mobility of workers on transitional labor markets.

## 2. Retirement systems under stress

### 2.1 Pay-as-you-go pensions

#### *Pay-as-you-go systems are vulnerable to low fertility rates*

Pay-as-you-go schemes in continental European countries are especially vulnerable to lower fertility because they rely on human capital of the young to finance the pensions of older generations. As generations invest less in the human capital of the next generations by reducing fertility, they should invest more in financial capital. In other words, lower fertility calls for gradually shifting from pay-as-you-go financing to funded pension schemes (see Sinn (2000)).

The need for increased saving as fertility declines is closely related to the so-called intergenerational contract. This implicit agreement between generations demands that each generation invests in the human capital of the next and is taken care of at the end of its life by the generations in which it has invested. Hence, each generation cares twice -- once for the previous and once for the next generations -- and is taken care of twice -- as a child and in old age. This contract used to be implemented on a family level. In modern societies, with shrinking family size and an increasing number of families without children, it is increasingly socialized. On a macro level, however, it is still valid. If generations invest less in human capital of children, they ought to invest more in financial capital in order to maintain their standard of living in old age.

#### *Focus pay-as-you-go systems on poverty alleviation*

Most continental European countries, including Germany, France and Italy, have integrated the two main functions of pensions -- poverty alleviation and old-age insurance -- into a single comprehensive public pension system. These countries should consider focusing the public scheme on poverty alleviation by gradually reducing earnings-related PAYG benefits for those earning higher incomes.<sup>3</sup> This would yield a better balanced portfolio between funded and PAYG schemes, as workers with middle- and higher incomes substitute private, funded pensions for public PAYG benefits (see Table 1). Individuals would thus better diversify political and market risks.

The public scheme dealing with poverty alleviation is explicitly redistributive and should be financed from general tax revenues. Reliance on broad-based taxes paid by the entire population rather than on payroll taxes shifts the tax burden away from workers to those outside the labour force, including the retired. Including retirement benefits in the base of the progressive income tax would allow the tax system to continue to play an effective role in intra- and intergenerational risk sharing. In this way, the tax system can pool risks and shift these risks to those who can bear them best.

Reducing PAYG benefits for, and increasing the tax payments by, the more affluent elderly is consistent with the trend towards a more heterogeneous older population. When PAYG schemes were established, the Second World War had impoverishd the older generation. Since poverty was thus concentrated among the

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<sup>3</sup> A flat public pension may be preferred over means-tested public pensions because means-tested benefits may be stigmatising. These latter benefits may also discourage saving. Finally, they may undercut the political support of the middle class for public pensions: targeted programs for the poor may result in poor benefits.

elderly, poverty alleviation called for transfers from the younger to the elder generation. At present, in contrast, age is generally no longer a good indicator of poverty, as many elderly have accumulated substantial financial wealth and more risks have shifted to the beginning of the life cycle. Hence, information on age should increasingly be supplemented by other information (in particular on incomes and family status) to identify those most in need of income support.

The currently retired generation has not been able to anticipate lower public PAYG benefits. Moreover, this generation cannot adjust easily because it has already depreciated its human capital. Accordingly, a strong case can be made for changing the rules of the game (i.e. reducing PAYG benefits and increasing taxes on the elderly) only gradually.<sup>4</sup> Extensive grandfathering provisions protecting those who are currently old are expensive, however, and would eliminate benefits in terms of enhanced fiscal sustainability. Indeed, grandfathering implies that younger generations have to pay not only for their own private benefits but also for the public benefits of the currently old. The government thus faces a trade-off between flexibility and stability. To enhance confidence and trust in a stable social contract while at the same time facilitating timely adjustments, governments should announce as early as possible any prospective changes in the social contract. This would allow the large baby-boom generations to anticipate reduced public transfers in retirement by starting to build up more funded pensions.

## **2.2 Occupational defined-benefit systems**

*Occupational defined-benefit pensions are on the way out*

Occupational defined-benefit plans in which companies guarantee fixed pension benefits by absorbing all financial market and demographic risks are on their way out. Several developments have led to the demise of defined-benefit plans. First of all, aging of the members<sup>5</sup> of the funds has expanded the obligations of the funds compared to the premium base (see Figure 1). This implies that unanticipated shocks in financial markets and longevity require larger changes in pension contributions in order to shield pension rights from these shocks. Guaranteed pension obligations have thus become more expensive in that they result in more volatility in payments for the contributors. More generally, in an aging world economy that thrives on entrepreneurship and in which human capital becomes increasingly scarce, the capacity for absorbing financial risk declines while the demand for risk taking increases. Whereas safe returns thus decline, rewards for risk taking increase. In any case, with the financial and actuarial risks of pension obligations starting to dominate those of their core business, companies no longer want to underwrite the risks of their pension funds. As an example, General Motors' pension liabilities are roughly equal to its market capitalization, at \$12 billion. Indeed, rather than becoming an insurer outfit, a company such as GM wants to focus on its core business.

Another reason why defined-benefit plans with a company guarantee are going out of business is an increasingly competitive and dynamic world economy. More intense competition implies that companies exhibit shorter life spans and enjoy smaller rents with which they can guarantee defined-benefit pensions. In a dynamic economy, constant innovation results in substantial creative destruction. Firms can thus offer less security to their employees. Indeed, defined-benefit promises more and

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<sup>4</sup> Relative PAYG benefits can be reduced gradually by indexing benefits to prices rather than wages.

<sup>5</sup> A *member* of a fund has pension claims on the fund. A *participant* of a scheme pays contributions, thereby accumulating pension rights.

more often end up being empty. Workers end up as residual risk bearers because companies often are in trouble at the same time that the pension fund is experiencing financial distress. The probability that a firm will experience periods of financial stress during the long horizon of the pension funding is substantial, especially in sectors facing intense international competition. The increased bankruptcy risk of sponsoring companies in a dynamic, more competitive economy implies that workers with defined-benefit claims are saddled with the substantial credit risk of the company for which they work. Hence, the workers are exposed to the risk of losing not only their job but also part of their pension if the company they work for loses out in competition. They tie their fate to the firm as regards not only their human capital but also their pension rights.

New accounting rules (FRS 17/IAS 19/FAS 87) provide another stimulus for companies to get out of the pension insurance business. These new accounting regulations disclose pension risks assumed by companies, thereby enhancing transparency. Moreover, solvency regulations force pension funds to mark their obligations to market. This enhances market discipline and facilitates better risk management. Most importantly, it enhances transparency by revealing the substantial costs of defined-benefit obligations. Indeed, ad-hoc actuarial rules for discounting pension obligations have in the past led to mispricing of pension guarantees.

#### *The demise of defined-benefit plans can be welcomed*

The demise of occupational defined-benefit pension plans can be welcomed for several reasons. First of all, to better diversify risks (credit risks, in particular), workers should invest their pension saving in the capital market rather than in the firm for which they work. Another reason why the decline of occupational defined-benefit schemes may be a blessing rather than a curse is that occupational defined-benefit plans often tend to suffer from conflicts of interest between the shareholders of the firm and the members of the pension fund. Among other things, it is often not quite clear to whom the surplus in the fund belongs and whose interest the fund should serve: the interests of the workers or the interests of the employer. Indeed, by changing its investment portfolio, the fund can redistribute resources between the various stakeholders of the fund. To illustrate, just as the other holders of corporate debt, the members of the fund have in fact written a put option to the shareholders of the firm. By encouraging the fund to invest more in risky assets, firms that face substantial bankruptcy risk can increase the value of this put option for the shareholders of the firm at the expense of the other stakeholders of the pension fund (see, e.g., Kocken (2006)). In this way, the shareholders of the firm, who enjoy limited liability, can reap the upside of the returns on the assets in the pension fund but shift the risks of the downside to the members of the pension fund.

### **3. A third way: collective stand-alone pension funds**

#### *Institutional innovation called for*

While old institutions are crumbling rapidly because governments and companies are withdrawing from their roles as risk sponsors, it will take considerable time to set up new retirement institutions. In the absence of new pension institutions that are better adapted to the modern knowledge economy in which we live, individuals will have a very hard time planning for their retirement.

Households typically lack the basic financial knowledge and computational ability to implement complex financial planning over the life cycle (see Lusardi and

Mitchell (2006) and Van Rooij, Lusardi and Alessi (2006)). In addition to individuals, also markets are imperfect. For example, annuity markets in many countries are poorly developed as a result of not only financial illiteracy of households but also adverse selection due to heterogeneous longevity risk (see Finkelstein and Poterba, 2004). In addition, the distribution of individual pension plans involves high marketing and management costs and, as evidenced by recent episodes in the UK, a substantial risk of misselling.

#### *Stand-alone collective pension plans as a third way*

Now that private and public sponsors are reducing risks on their balance sheets, collective pension plans based on capital funding offer an appealing third way between the purely individual DC plans in the Anglo-Saxon countries and the collective pay-as-you-go systems in the continental European countries. These collective pension plans allow individuals with scarce cognitive abilities to delegate complex saving and investment decisions to professionals. The latter assist individuals in properly exploiting their long-run investment horizon and in gaining access to complex investment strategies provided by modern financial markets. Mandatory participation combats adverse selection in annuity markets and reduces marketing and other transaction costs. Moreover, more sophisticated life-cycle investment by pension funds on behalf of long-term investors stabilizes financial markets and facilitates macroeconomic stability. Finally, these collective schemes can create risk-sharing contracts between generations that are not (yet) available in financial markets. To illustrate, they in effect offer deferred wage-indexed annuities, which are not yet traded on financial markets.

These pension funds stand alone in the sense that they lack a risk-absorbing sponsor in the form of the government or corporations. Pension funds thus face a hard budget constraint so that the members of the fund become the explicit risk bearers: they have to either share risks among themselves or shift risks to others by trading financial instruments on capital markets. An important advantage of stand-alone pension funds is that the ownership of the assets lies unambiguously with the members. Companies no longer have a claim on a possible surplus in the pension fund and are thus no longer tempted to increase the risk profile of their pension fund in order to maximize the return on the company's equity at the expense of the members' fiduciary interest.

#### **4. Stand-alone pension funds: institutional innovations**

As the second pillar of the Dutch pension system, Dutch sectoral pension schemes have been evolving in the direction of stand-alone pension funds. This section describes this evolution and discusses the major remaining challenges facing the Dutch pension funds. Indeed, several developments call for further reforms in the way occupational pension funds operate. Maintaining the virtues of the Dutch pension system in a rapidly changing environment requires the timely response of occupational pension schemes and their stakeholders to these trends. Responding sooner rather than later will allow pension reforms to be implemented gradually rather than suddenly. This helps to maintain confidence in stable, credible long-term commitments.

## 4.1 Complete contracts on risk sharing

Explicit agreements about how members share risks are becoming more important for several reasons. First, being the residual risk bearers in pension plans, members should be informed about what risks they face so that they can take this into account in their own financial planning. Second, risks increase as pension funds become mature and members age (see subsection 2.2). The way these risks will be shared is thus increasingly important for the members. Third, information and communication technology helps to define individual property rights without giving rise to excessive transaction costs.

Making explicit agreements about how risks are shared before the shocks actually materialize (i.e. implementing state-contingent rules) also prevents costly political conflicts when the shocks hit.<sup>6</sup> These risk-sharing rules thus alleviate political risks and pension-related anxiety among workers. Moreover, sharing risks *ex ante* allows for contracts that are advantageous for all parties (i.e. giving up resources in one contingency is traded with receiving resources in another contingency). After the shock (i.e. *ex post* when the contingency that actually materializes is known), in contrast, one of the parties has to give up resources. Insurance then becomes redistribution. Finally, explicit risk sharing on the basis of complete contracts avoids litigation, which is often the result of ambiguous, incomplete risk-sharing agreements, and which generates additional transaction costs.

In the Netherlands, pension funds have strived to make risk-sharing contracts more complete. Several large pension funds now employ policy ladders -- rules that state explicitly how both the extent of indexation of pension rights and a possible recovery premium (levied on top of the cost-based premia for the newly accumulated pension benefits) vary with the funding ratio. These policy ladders can be viewed as more complete contracts compared to the previous rather incomplete ones, which allowed for a great deal of discretion by the governing board. Indeed, in the past, funds would make only rather ambiguous statements that pension rights would be indexed as long as the financial position of the fund would allow it.

Further improvements are possible in making the policy ladder more complete, so that property rights on the assets are more clearly defined. To illustrate, the current policy ladders tend to be silent on what happens in case the funding rate (i.e. assets as a percentage of the nominal liabilities) falls below 105% or rises above the level that is necessary to finance fully indexed pensions. Hence, it is still not clear who owns the so-called buffers (i.e. the capital in excess of the nominal liabilities).<sup>7</sup> Indeed, these buffers may help to raise the pensions of especially the younger members above the nominal obligations. However, depending on the decisions of governing board, these buffers may also be saved for the benefit of future generations or be used to cut premia. The policy ladders are also incomplete in the sense that they

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<sup>6</sup> In designing state-contingent rules, pension funds face a trade-off between commitment and flexibility. On the one hand, pension funds may want to create clarity *ex ante* how risks are shared, for the reasons described in the main text. On the other hand, funds may want to leave some discretionary powers so that they can respond to unforeseen contingencies. This latter flexibility implicit in incomplete contracts requires, however, that participants trust the governing board to act in the fiduciary interests of the participants. This requires professional governance (see subsection 4.8 below).

<sup>7</sup> The word *buffer* is in fact a misnomer. A positive buffer suggests that the fund owns assets in excess of its obligations, while it in fact signals merely that assets exceed the *nominal* obligations. The buffer thus includes the capital that is needed to index pensions for inflation. Hence, the pension fund may not have sufficient capital to cover all of its obligations (including the conditional obligation to index the benefits), even though the buffer is positive.

do not specify investment decisions. By changing investment decisions, governing boards can redistribute resources among the various stakeholders of the fund, depending on the various options that are written by the stakeholders of the fund (see Hoevenaars and Ponds (2006)). Finally, policy ladders are at present not more than guidelines for the governing board. They have therefore no legal status and thus do not offer the same protection as legal property rights do.

#### **4.2 Smaller role of recovery premia in risk sharing**

##### *Intergenerational risk sharing*

Pension funds allow generations to share financial and human capital risk. In particular, by linking pension benefits to wages of workers, they allow retirees to share in the wage risks of workers. Moreover, in traditional final-pay schemes, young workers share in financial market risks faced by the older members through so-called recovery premia. In the case of an adverse financial shock, for example, pension premia are raised so as to contain the decline in pension benefits paid out to retirees, to protect the pension rights of the workers, and to reduce the resulting funding deficit. In a defined-benefit scheme with wage-indexed retirement benefits that carries mismatch risk because of investments in risk-bearing assets, the active participants (i.e. the workers who pay premia into the fund) in effect borrow from the older, retired members by issuing non-tradable wage-indexed bonds to these older members and use the funds to invest in the risk-bearing assets. In fact, the risky pension contributions produced by the mismatch risk allow the young to transform their human capital into an asset with exposure to financial risks (see Beetsma and Bovenberg (2007)).

##### *Borrowing to buy risk-bearing assets*

Indeed, the first-best asset allocation in simple models of life-cycle investment implies that one should borrow at the beginning of one's career and invest the proceeds in the stock market to acquire sufficient exposure to the equity market. Adverse selection and moral hazard, however, typically preclude borrowing against future labor income. In the absence of slavery, financial institutions cannot use human capital as a collateral to ensure that the loan is paid back. Compulsory participation in collective pension schemes can alleviate the adverse selection and moral hazard problems faced by financial intermediaries when young workers borrow against their human capital in order to gain the optimal exposure to priced equity risk. In effect, mandatory participation helps to secure the human capital of younger generation as collateral, thereby limiting bankruptcy risk and thus relaxing the credit constraints faced by young generations. The welfare gains of being able to avoid completely the borrowing constraints have been estimated around 3% of certainty equivalent consumption during the life cycle (see Bovenberg et al. (2007)).

In the past, borrowing-constrained young workers were willing to provide pension guarantees at low costs because their borrowing constraints prevented them from taking advantage of the risk premia offered on capital markets. The workers offered the pension insurance at less than market price: they did not charge the equity premium for the risk they bore in the form of fluctuating recovery premia.<sup>8</sup> Pension

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<sup>8</sup> For constrained households that cannot freely access capital markets, the market value of assets can deviate from the shadow value as measured by marginal utility values. In particular, households that cannot borrow to acquire the optimal exposure to equity risk attach a larger shadow value to equity than the value on financial markets.

funds could therefore offer guaranteed pensions while at the same time benefiting from the equity-risk premium.

*Going short before entering the workforce*

In principle, one can share current shocks not only between currently living generations but also with generations that are not yet participating in the pension scheme when the shocks actually materialize. In fact, the pension fund buys risk-bearing assets on behalf of future generations by in effect borrowing from older generations. From an ex-ante point of view, this internal trade is actually welfare improving. The reason is financial shocks are shared even more broadly, namely not only with the currently participating generations but also with future generations (see Teulings and de Vries (2006)). Just as current young generations, the future generations were offering the pension insurance implicit in bonds they issued to older generations at less than the market price. Current generations thus benefited from the welfare gains generated by this risk taking of future generations.

*Rising costs of recovery premia as implicit taxes...*

Reliance on fluctuating recovery pension premia to implement intergenerational risk is increasingly costly, however, in terms of adverse demand- and supply-side effects. This is especially so because the aging of the members of pension schemes demands larger changes in contributions to contain fluctuations in pension benefits because pension obligations expand compared to the premium base (see Figure 1 and subsection 2.2). Hence, the costs of volatile premia are increasingly being recognized.

*...on the demand side...*

Fluctuating recovery pension premia are likely to affect the demand side of the economy in a pro-cyclical fashion. In particular, in a recession, risk premia tend to be high while risk-free interest rates are typically low. High risk premia reduce the value of risk-bearing assets (including equity). Moreover, with mark-to-market valuation, low interest rates imply that the value of the guaranteed liabilities is substantial, at least as long the pension schemes have not hedged the interest rate risk through derivatives.<sup>9</sup> With the low funding rates that result for the low value of assets and the high value of liabilities, pension funds have to raise premia in a recession, which hurts the cash flow of workers and amplifies the recession. This “pensions accelerator” mechanism is thus comparable to the “financial accelerator” arising from worsening credit conditions (Bernanke and Gertler (1989)).

*...the supply side*

As regards the supply side, the fluctuating pension contributions distort the labor market. Indeed, higher pension contributions aimed at correcting funding deficits in fact act as an implicit tax on labor. Workers will try to avoid paying this tax by working in the informal sector or moving to another sector. Indeed, with increasingly mobile labor in a transitional labor market, employers may have to pay compensating wage differentials to attract workers to their sector if these workers are forced to pay off funding deficits of the sectoral pension scheme through recovery premia. In this way, workers can shift the burden of the implicit tax to others, such as consumers in non-tradable sectors or to shareholders in tradable sectors facing intense international

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<sup>9</sup> By protecting pension funds against low interest rates in an economic downturn, these derivatives may thus enhance macroeconomic stability, depending on how the ultimate risk bearers (to which these derivatives shift the risk) respond to the capital losses they incur.

competition. Firms thus bear the risks of the fund, even though they do not pay the statutory premia. Indeed, underfunding can in effect be viewed as debt overhang that will depress economic activity in the sector (or firm) concerned.

*Also political considerations yield discontinuity principle*

If active workers face substantial recovery premia to correct the funding problems of pension schemes, they may vote with not only their *feet* (by seeking employment elsewhere or reducing labor supply) but also their *voice*. In particular, they may encourage the pension scheme to default on the implicit pension obligations to older workers and retirees -- for example, by no longer indexing their pensions to inflation. In addition to competition on labor, capital and commodity markets, political economy considerations thus make current members vulnerable to large negative buffers. In other words, a pension contract that may generate substantial debts for young and future generations may not be time consistent and thus be neither credible nor sustainable.

This is why regulators adopt the so-called discontinuity principle: a pension scheme should be able to comply with its obligations also if, starting today, no new generations would be willing to enter the scheme. Recognizing that pension schemes cannot easily secure the human capital of future generations, this discontinuity principle limits the scope for risk sharing among non-overlapping generations. Pension schemes thus face a tension between, on the one hand, the discipline of capital funding and, on the other hand, the flexibility to allow risk sharing across non-overlapping generations.

As an alternative to pension funds, families and governments can share risks across non-overlapping generations. Governments implement this risk sharing through public debt policy, pay-as-you-go financed pensions, or publicly financed education. By issuing long-dated longevity bonds, for example, governments could allow present generations to share longevity risks with yet unborn generations (see also sub-section 4.5). Compared to pension funds, the government is often in a better position to redistribute across individuals and to share macroeconomic risks across non-overlapping generations. The reason is that governments are endowed with tax power over a large pool of people: the nation as a whole. Collective pension schemes, in contrast, wield less effective tax power -- even if workers in a sector are forced to participate in a sectoral scheme. This is because labor-market mobility within a country is growing and is larger than labor mobility between countries. The main drawback from intergenerational risk sharing through the public budget is that governments suffer from more political risks than pension funds do. Society thus faces a fundamental trade-off between facilitating intergenerational risk sharing, on the one hand, and containing political risks, on the other.

### **4.3. Restructuring liabilities of pension funds**

*Limits of liability-driven investment*

Some pension schemes contain the fluctuations in recovery premia by restructuring portfolios to match the guarantees in defined-benefit pension plans, the so-called *liability-driven investment*. Extensive liability-driven investment aimed at matching risk-free pension promises may endanger macroeconomic and financial stability and growth. As long-term safe interest rates are driven down by the demand of pension funds for bonds, guaranteed pension promises become ever more expensive, thereby requiring even more pension saving. This process may set in motion a deflationary

spiral. At the same time, the supply of risk-taking capital may dry up, thereby harming innovation and growth. Moreover, additional demand for fixed-income assets may undermine fiscal discipline and widen global financial imbalances by simulating private borrowing.

A shortcoming of liability-driven investment with secure pension liabilities is that young individuals fail to take advantage of the risk premium of equities; buying guarantees is indeed quite expensive in terms of lost expected returns. By shifting financial risks to other parts of the financial system, pension funds cannot act as a stable long-term investor on behalf of participants and members with a long-run investment horizon.

Defined-benefit pension schemes should therefore restructure their liabilities rather than simply restructuring their assets to better match these. Collective pension schemes should thus think hard about determining the optimal liability structure from the point of view of the members now that sponsors and participants are less willing or able to guarantee benefits at low implicit prices. As a direct consequence, the price for guaranteed retirement benefits has increased. It thus has become more attractive to have more risky pension rights so that a liability swap away from secure claims to equity-type claims may be in order. Members can thus continue to take advantage of the price of risk, which tends to increase as a consequence of aging (see subsection 2.2). The pension fund therefore does not have to shed all risk to capital markets, but can absorb this risk through more flexible liabilities.

#### *Dutch pension funds*

The largest Dutch pension schemes have moved away from final-pay schemes to career-average schemes with conditional indexation of nominal pension rights. Pension schemes have thus made the indexation of not only the pension rights of the already retired members but also the pension rights of the active members conditional on the financial performance of the pension fund. Younger workers share in financial market risk through not only recovery pension premia but also their pension rights. As a result of these reforms, the active working population absorbs more risks in terms of their pension rights than in terms of recovery premia. In case of a negative financial shock, for example, workers face not only higher pension contributions but also a lower real value of their pension rights. Hence, more risks are borne in terms of pension capital rather than human capital. Instead of younger workers, the older workers, who have accumulated most pension rights, are thus most exposed to current financial-market risks.

#### *Optimal risk sharing through pension rights*

The current risk-sharing arrangements in the Dutch pension funds can be improved further. Efficient risk sharing implies that an adverse shock causes consumption of all agents to decline by the same percentage.<sup>10</sup> Risks are thus shared as broadly as possible. With permanent income determining consumption, everybody's wealth should thus decline by the same percentage after a negative shock. Efficient risk sharing is important because it allows an economy to take more risks without endangering macroeconomic stability. This boosts innovation and economic growth through entrepreneurship and experimentation.

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<sup>10</sup> This assumes that all agents feature the same constant relative risk aversion and that utility is time-separable and separable in consumption of commodities and leisure. More generally, optimal risk sharing implies that everybody's marginal utility changes with the same percentage after a shock hits. See Bohn (2005).

The most important components of aggregate wealth of individuals are pension wealth, housing wealth, and human wealth (i.e. the discounted value of future labor income). For younger workers, human wealth is the most important wealth component. For older members, in contrast, pension rights account for most of individual wealth. In fact, retirees have (almost) completely depreciated their human capital. Hence, in order to achieve the same relative change in overall wealth for all cohorts (as required by optimal risk sharing), the pension wealth of young cohorts should fluctuate more than that of older generations if a shock hits the pension funds. By adapting pension rights in this way, one can shift financial and demographic risks to younger generations without having to rely on the recovery premium instrument.<sup>11</sup> Whereas pension rights for younger generations are relatively uncertain (i.e. the system resembles a defined-contribution system), pension rights are less risky for the elderly. As individuals grow older, they thus transform their defined-contribution claims into defined-benefit claims.

*Young agents bear risks through pension rights rather than volatile labor taxes*  
Having younger workers share in financial market risk through their pension rights rather than recovery pension premia yields smaller adverse effects on supply and demand sides of the economy. As regards the supply side, intergenerational risk sharing does not distort labor incentives if pension rights rather than recovery pension contributions fluctuate with macro financial market and longevity risks. Intuitively, members cannot escape the ex-post transfers to retirees by working less or by moving to another sector (including the informal sector). Debt overhang is excluded as liabilities move together with assets. Funding deficits are thus excluded so that workers are no longer taxed on their work effort. Indeed, members (i.e. those who have accumulated pension rights) rather than participants (i.e. those who pay contributions) are the residual risk bearers of the fund.

Also demand effects of pension risks are reduced. In particular, adverse financial shocks are not directly transmitted into the cash flow of workers. Rather, they are transferred into the ‘paper’ pension rights of especially young workers. In this way, the pension fund exploits the long ‘recovery horizon’ of these workers; these workers feature a long period during which they can undo negative effects on pension wealth by paying a somewhat higher contribution financed by lower consumption (see subsection 4.7) or higher work effort (see subsection 4.6).

*Long recovery horizon benefits macro-economic stability*  
Exploiting the long horizon of young workers to buffer shocks enhances macroeconomic stabilization. Indeed, the marginal saving propensity out of pension wealth is smallest for young households exhibiting long horizons and substantial human capital. In particular, it reduces the tension between facilitating macroeconomic stabilization and enforcing the discipline of markets, which tend to be cyclical. In particular, by letting the pension obligations to young workers fluctuate more with interest rates and risk premia (and thus taking advantage of the long recovery horizon of young workers), we limit the pro-cyclical effects of the discipline of mark-to-market valuation. Young members should in fact be stable long-term

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<sup>11</sup> This assumes that pension wealth does not become negative to produce the required relative change in overall wealth. For young households, this may happen if shocks are adverse in the beginning of their working life. To prevent this happening, these households should buy call options to get the optimal exposure to stock-market risk. If these instruments are not available, recovery premia may be used to expose these households to equity risk, even though these premia distort the labor market.

investors who are in the best position to absorb financial-market volatility.

To contain pro-cyclical effects further, accumulated new pension rights may be relatively small in recessions (when interest rates tend to be low and pension rights are thus relatively expensive) and large in booms in order to avoid pro-cyclical variations in saving rates that would otherwise arise (i.e. raising pension saving if interest rates fall, and decreasing savings if interest rates rise).

#### *Hard and soft obligations of pension funds*

This hybrid system of both defined-contribution and defined-benefit elements can be viewed as a pension fund that has on the liability side of its balance sheet both *soft* equity claims (or *junior* claims) and *hard* debt claims (or *senior* claims). The active members who are not yet retired, and especially the young members who still have substantial human capital, hold most of the *soft* claims and are thus in fact the residual risk bearers of the fund. Workers therefore are important owners of equity and the associated control rights. They thus control an important part of the economy's capital stock, albeit in a different way than Marx anticipated. The retired generations own more secure claims in the form of debt.<sup>12</sup> The young agents are in fact the owners of an insurance company that protects older members against old-age risks if the pension fund has not matched the guaranteed pension rights of the older generations on the capital market. In this way, young agents can go short and increase the exposure of their claims to risk. The claims on this insurance outfit are not traded on capital markets, but are assigned to agents depending on the nature of their work effort on the labor market.

Dutch pension funds already make a distinction between *hard* and *soft* claims. However, they grant the wrong hard guarantees to the wrong people. In particular, the hard rights (i.e. the guarantees) are defined in *nominal* rather than *real* terms. Hence, the Dutch pension system (and the pension rights of young agents with a longer investment horizon in particular) is vulnerable to inflation now that pension funds are tempted to match these nominal obligations with nominal assets.<sup>13</sup> Moreover, these hard rights are granted to all members, irrespective of their characteristics (such as age<sup>14</sup>). The solvency rules in the Dutch risk-based supervisory framework in fact focus on the hard rather than the soft pension rights, which typically involve the ambition of the pension funds to index pension rights to prices or even wages. Hence, capital funding does not necessarily extend also to soft pension rights.

If the older generations would hold most of the debt claims in accordance with the requirements for optimal intergenerational risk sharing, the duration of the debt-like obligations of the pension funds would fall. This would relieve some of the current pressure on the returns at the long end of the market for fixed income securities. Hence, rather than adding high duration fixed-income assets to meet the duration of their fixed-income promises, pension funds may want to reconsider the

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<sup>12</sup> The retired generations may still find it optimal to have some exposure to stock-market and longevity risk. Kojien, Nijman and Werker (2006) find that with plausible parameter values, retired agents should hold 20% percent of their pension wealth in equity. In fact, in the simplest model with homogeneous and constant relative risk aversion and no mean reversion of stock returns, all generations hold the same share of overall wealth in equity (see Bovenberg et al. (2007)). Most of the equity is held by younger workers because they feature the longest remaining lifetime and are thus wealthiest.

<sup>13</sup> For maturities of over 35 years, inflation risk is persistent and thus substantial over a long horizon. Campbell and Viceira (2005) report that the annualised standard deviation of real returns on nominal bonds is as large as 8% and exceeds that of stocks.

<sup>14</sup> The ratio of soft to hard pension rights, however, is especially large for young participants because of the long duration of their soft indexation claim in the fund.

fixed-income promises to young members. Internal and external supervision should ensure solvency so that members who hold secure claims (mainly the old) are protected against bankruptcy. This supervision should thus ensure that the bond-like promises issued by the young members of the fund to the older members are in fact credible; the put option that the debt holders have in fact written to the shareholders should not have to be exercised.

### *Optimal life-cycle investment*

Individuals transforming their defined-contribution claims into defined-benefit claims as they grow older is consistent with optimal investment behavior over the life cycle (see Bodie, Merton and Samuelson (1992)). Young agents invest more in risk-bearing assets because most of their wealth consists of less risky human capital.<sup>15</sup> As agents grow older, they move more into secure assets, which are preferably also protected against inflation (see Teulings and de Vries (2006)).

These arguments for diverging investment behavior of young and old become even stronger with habit formation.<sup>16</sup> In that case, the young have more time to adjust their habits and thus should be able to take on more risk than the old. In any case, downward protection of the standard of living of the elderly, who have depreciated their human capital, thus goes together with more risky DC-type pensions for the young, who can exploit their human capital to buffer risks. This gives the young more upward potential so as to keep their pension costs within bounds. A hybrid system of both defined-contribution and defined-benefit elements thus emerges involving risk sharing between young and old members.

Compared to an occupational pension scheme in which the sponsoring firm absorbs the risks, the young members take over the risk-bearing role of the sponsor (or the shareholders of the sponsoring firm) in a stand-alone pension scheme. Whereas younger members lose guarantees, they should be compensated by more upward potential. In other words, young workers may lose pension rights if the stock market turns bad, but in return accumulate more additional rights if financial markets perform well. This two-sided ‘solidarity’ of the young protecting the old in bad times and the young gaining more in good times serves the legitimacy of the pension system.<sup>17</sup>

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<sup>15</sup> A complication is that optimal investment behaviour may demand that young workers invest more than 100% of their pension rights in equity. To allow young workers to acquire the optimal exposure to equity risk without running the risk of ending up with negative wealth, the pension fund can invest in call options on behalf of these workers. Alternatively, the pension fund may not match the obligations to older generations and shift the mismatch risk to younger generations. If these risks run down the entire pension wealth of the younger generations, then some limited recovery premia on these generations may be necessary - even though these premia distort the labour market (see subsection 4.2).

<sup>16</sup> Loss-aversion preferences also strengthen these arguments (see Bernatzi and Thaler (1995)). If agents exhibit loss aversion, the costs of risky investments rise less rapidly than the benefits of doing so (see Bovenberg et al. (2007)). Hence, hard guarantees are rather expensive for young agents in view of their long horizon. For older, loss-averse agents with shorter horizons, risk-bearing assets are less attractive.

<sup>17</sup> Note that the risk trading between various participants can be based on objective market prices only if the underlying instruments are in fact traded on financial markets. To the extent that these instruments are not traded (such as wage-indexed bonds or longevity bonds), the internal prices are subjective and may depend on the preferences, features and bargaining power of the trading partners. To the extent that participants do not have direct access to financial markets, shadow prices may differ from market prices. To illustrate, by allowing young workers with no collateral to borrow against their human capital so that these workers can invest in the stock market, the fund may be able to expropriate part of the premium on equity. The reason is that borrowing-constrained young workers require a reward for risk taking below the market price. See also footnote 8.

#### 4.4 Less back-loading of the accumulation of benefits

Many pension plans are back-loaded. This means that most workers accumulate most of their pension rights at the end of their working career. In particular, the young pay the same price for a deferred annuity even though the money they contribute will be paid out later and thus can yield a higher overall return. This lack of market pricing implicit in the uniform pricing of deferred annuities implies that the young are taxed on their working effort while the old are subsidized.

The back-loading of benefit accumulation belongs to an era in which a breadwinner worked his entire life in a full-time job at a single employer who took care of the pension risks for the employee. Back-loading starts to result in inequitable outcomes, however, in a transitional, more flexible labor market in which workers experience voluntary periods of (partial) time-outs from work or become self-employed during certain phases of their life course.<sup>18</sup> Lack of market pricing implicit in the uniform pricing of deferred annuities complicates free choice and free competition and results in all kinds of distortions. To illustrate, it discourages people from becoming an entrepreneur later in life or from moving abroad. More generally, it inhibits the portability of pension rights if people engage in various transitions in the labor market.

Another reason why the back-loading of benefit accumulation becomes less attractive involves a shift of risk bearing. Sponsors (such as employers) are increasingly shifting pension risks to workers. To contain risks for elderly members, young workers have to absorb more risks (see subsection 4.3). To reward these younger workers for taking over the risk bearing role of sponsors, they should (in expectation) collect more pension rights for the pension premium paid.<sup>19</sup>

The back-loading of benefit accumulation creates political risk for older workers by making the system vulnerable to individual systems (in other countries or other sectors, including self employment) in which young workers can buy pension rights for the money worth of their contributions (after the deduction of transaction costs). Indeed, the pension rights that middle-aged workers anticipate accumulating in the remaining working period (after subtracting the premia that these workers will pay during the rest of their lives) are not backed by financial assets, but rather rely on the promise of young workers (or employers) to supplement the money put in by middle-aged workers. Burdening intergenerational risk sharing with predictable redistribution makes the pension system less robust: the pension scheme faces a larger discontinuity risk. In particular, younger agents may leave the system if they are confronted with substantial recovery premia. Indeed, the implicit pay-as-you-go (PAYG) financing implicit in the back-loading of the financing of benefits makes the pension scheme less well funded (and thus more vulnerable to political risks) than appears from the official funding rate.<sup>20</sup>

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<sup>18</sup> The transition from a final-pay to a career-average system (see subsection 4.3) has increased back-loading. Under the final-pay system, the rights accumulated in the beginning of the career could become valuable if one experienced substantial wage increases during one's career. This is no longer the case under the career-average system.

<sup>19</sup> The reforms proposed in subsection 4.3 and this subsection are also related in another way. In particular, young workers can absorb more risks in their pension rights if they accumulate more pension rights as a result of less back loading.

<sup>20</sup> This is another reason why the word *buffer* is a misnomer. In particular, the funding rate underestimates the implicit obligations to middle-aged workers who have in effect paid premia in advance without having received the equivalent market value in pension claims. These workers expect

Addressing the back-loading of benefit accumulation and marking pension premia to market (in the sense that the premium paid corresponds to the value of the additional pension rights accumulated) is difficult because it creates the familiar transitional burden of moving from PAYG to full funding. Possible solutions include using collective buffers or asking sponsors who want to get rid of the risk to pay a one-time fee for transferring these risks to their younger workers. In any case, a long transition period will allow pension schemes to gradually implement two-sided solidarity between the young and the old.<sup>21</sup>

In order to contain distortions in transitional labor markets, our proposals in this subsection (reducing the back-loading of benefits) and the previous one (absorbing shocks in terms of pension rights rather than recovery premia) in fact lead to marking to market the additional pension rights that workers accumulate by paying contributions: workers get back the monetary value of their contributions in the market value of their pension rights. In this way, pension contributions become part of the labor reward rather than being a tax or subsidy on work.<sup>22</sup> Additional pension rights are priced actuarially fairly: they do not add to or subtract from the wealth of the other stakeholders in the pension scheme.

#### 4.5 Sharing longevity risk

##### *Funded schemes are vulnerable to longevity risk*

A longer life expectancy raises the length of the inactive period that needs to be financed. Hence, increased longevity puts financial stress on not only pay-as-you-go-schemes but also funded pension schemes. In fact, if retirement ages do not adjust to higher life expectancy, funded pension schemes are particularly vulnerable. The reason for this is that the longer life spent in retirement calls for more financial saving, which depresses the return on capital. This is bad news for funded pension schemes. Moreover, if commodities and services are not perfectly tradable, shifts in the real exchange rate and real wages imply that the return on pension saving declines – even in a small open economy that is perfectly integrated in world financial markets. Intuitively, as the older, inactive generations become larger in number compared to the active working generation, a tight labor market raises real wages, thereby depressing the real value of the capital that the older generations have accumulated.

Aging societies should not only raise financial saving through more funded pension schemes but also increase investment in human capital so as to protect long-run labor supply. Aging challenges not only fiscal budgets but also risk taking and labor supply. It thus calls for more accumulation, better maintenance and more intense

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to receive a subsidy from younger workers in the second half of their working life. In other words, they have an implicit claim on the pension fund that is not taken into account when computing the funding rate. Boeijen et al. (2006) estimate that the implicit obligation of PGGM due to back-loading of benefit accumulation is in the order of 15% of the PGGM's current nominal obligations.

<sup>21</sup> Another alternative is to extend the tax on youngsters and the subsidy on old workers from employees also to the self employed. This alleviates the drawbacks of back-loading for domestic labor mobility. These explicit age-specific transfers could gradually be phased out as older workers get a stronger labor-market position.

<sup>22</sup> The pension premium in the first, public pillar, in contrast, involves a tax element since the first pillar is aimed at fighting old-age poverty through intra- and intergenerational redistribution. Even if contributions are actuarially fair, they may still act like a tax if liquidity-constrained workers are forced to participate in pension saving.

use of human capital in addition to fiscal discipline and additional private saving. Indeed, human capital allows households to buffer more risks.

#### *Internal trade of longevity risk*

To prevent this stress on funded pension systems, longer life expectancy for cohorts younger than 65 years of age must go together with a higher retirement age (or lower annual benefits) for the cohorts concerned if lower mortality is associated with lower morbidity and thus more human capital. If these shocks materialize only at older ages at which the cohort has already depreciated its human capital, younger cohorts (who exhibit a longer horizon and more flexibility to adapt) should optimally share a larger part of these risks. A collective pension scheme can implement this particular way of sharing risks between generations. In particular, the pension fund can promise an annuity to retirees while at the same time making the pension rights of the active members conditional on the capital that remains available after meeting these obligations to the retirees. The pension fund then in fact issues longevity bonds on behalf of the active members to the retired members. In this way, pension funds in effect create new non-tradable assets that are not yet available on financial markets.<sup>23</sup> Pension governance and pension supervision should ensure that these contracts between generations are not only beneficial *ex ante* but also can be enforced *ex post* (i.e. after financial and human capital risks have materialized). Immediate and thus continuous adjustment of pension rights to developments in capital and labor markets can help in this respect.

#### *Longevity bonds and indexing retirement age to longevity*

In addition to stimulating financial innovation, liquid markets for longevity-indexed bonds would help to establish objective market prices for longevity risk. This would assist regulators and help pension funds in setting the terms of trade for internal risk trading between generations. Moreover, longevity bonds would allow members of a pension fund to trade not only with other members in the same fund but also with capital-market participants more generally. Indeed, there is a strong theoretical case for developing *macro-markets* for such contingent securities (see Shiller (2003)).

In theory, governments can be providers of longevity bonds, as they are in a good position to shift this risk on to future and younger generations. These generations may be able to absorb these risks best through a longer working life associated with more human-capital investment. Governments, however, already bear substantial longevity risk on their balance sheets through public pay-as-you-go systems. Indeed, governments are able to issue longevity bonds on behalf of younger and future generations only if they reduce their exposure to longevity risk by linking the age at which these generations first receive their public pension to life expectancy.

Also tax benefits for pension saving can be linked to life expectancy.<sup>24</sup> The rule of automatically linking public pensions and tax privileges to life expectancy avoids the political costs of discretionary decisions to limit eligibility to public

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<sup>23</sup> If pension funds differ in their age composition, swaps between older and younger pension funds can in theory further facilitate this risk sharing. Alternatively, pension funds with many retirees may insure the longevity risk with insurance companies. In this way, the shareholders of the insurance company rather than the younger participants of the pension fund absorb the longevity risk. Moreover, insurance companies with many life insurance products may be the most natural partner for this trade because these companies are short rather than long on longevity risk.

<sup>24</sup> In fact, one can argue that all ages that are used to measure old age should be linked to longevity. In other words, one should measure old age from the end rather than the beginning of life.

pensions and tax benefits if longevity increases further. Agreeing on a risk-sharing rule *ex ante* also reduces the political risks associated with collective discretionary decision-making. Moreover, it allows individuals and firms to gradually adapt to a longer working life by better maintaining human capital and adjusting the organization of work. An increase in spending on disability pensions and unemployment benefits is thereby avoided.

#### *Higher retirement age crucial for more investment in human capital*

A higher effective retirement age when longevity increases is crucial for several reasons. First of all, it maintains the return on funded pension systems by raising labor supply and thus containing the potential rise in the capital-labor ratio. It also raises the return on human capital by lengthening the horizon for investments in human capital. Moreover, longer and deeper involvement in paid employment allows people to exploit their longer life to reconcile the two ambitions of, first, investing in the next generation as a parent and, second, pursuing a fulfilling career in paid work in which one keeps learning and applying new technologies. A longer active working life facilitates greater flexibility in employment patterns over the course of life for men and women alike by loosening the link between age and career progression. This reduces career pressure at the biologically determined time when parents care for young children, thereby promoting gender equality, fertility and child development. Parents of young children can continue to invest in the human capital of their children without having to depreciate their own human capital. Rearing children thus becomes less costly in terms of depreciated human capital of the parents. In this way, countries escape a vicious circle of early retirement and lower fertility in which politically stronger older generations favor generous passive spending on pensions and healthcare at the expense of investments in the human capital of younger generations.

## **4.6 Labor-market flexibility**

### *Labor-market flexibility boosts risk taking and innovation*

More flexible labor markets complement a longer and more flexible work life. Together with better-maintained human capital, they allow the speed and extent of phased retirement to act as a buffer for absorbing aggregate financial market and aggregate longevity risks. In an actuarially neutral pension system, working one year longer (and thus receiving annuities one year later) tends to raise the annual pension by about 7 percent. The speed and timing of retirement is thus a powerful instrument for absorbing risks.

Flexible labor-market institutions should also enable parents of young children to easily enter, re-enter and remain in the labor market. With workers able to absorb risk, pension funds can continue to supply risk-bearing capital, thereby boosting innovation and growth. We thus prevent the vicious circle of a risk-shedding scenario in which inflexible labor markets make workers unwilling to bear risk and pension funds invest mainly in low-risk government bonds, thereby crowding out productive investments (see Boeri et al. (2006)).

### *More flexible labor markets for elderly workers ...*

Allowing the speed and time of retirement to act as an instrument to buffer risk requires adjusting the implicit labor contract according to which workers are underpaid when young and overpaid later on. Indeed, increasing the retirement age at which the employer lays off the employee must not put undue strain on the employer.

Employees should thus accept more wage flexibility over the life course (payment according to labor productivity, i.e. mark to market reward for labor) and internal flexibility in working practices (so as to protect their labor productivity at higher ages).

With a more flexible labor market for elderly workers, older workers bear less risk because they are less dependent on their firm surviving. The differences narrow between the *insiders* who are lucky enough to work for a surviving firm and the *outsiders* whose firms have not survived. Moreover, golden chains no longer tie older workers to their employer. This facilitates entrepreneurship and a more efficient allocation of labor. Indeed, workers can more easily transfer between different states in the labor market (e.g. entrepreneurship, full-time employee, part-time worker, part-time retirement, etc).

*...and younger workers*

More generally, more flexible labor markets with new, flexible career patterns should allow young households to bear more risks by allowing these households to vary their labor effort depending on the shocks they have experienced throughout their life time. This requires European labor markets to become more inclusive so that workers do not have to be continuously full-time employed in order to enjoy a successful career.

*New roles for employers...*

In such a transitional labor market, the role of employers thus shifts from a risk-bearing sponsor to, first, a facilitator of investments in human capital; second, an insurer of that human capital by protecting it; third, the creator of flexible work arrangements that allow elderly workers to adjust the speed and time of retirement to the pension rights; and fourth, the creator of flexible career path and workplaces that allow young parents to invest in the human capital of their children without having to depreciate their own human capital. Employers should attune work to the needs of employees who want to remain employable in the face of substantial family obligations and rapid innovation (and thus creative destruction).

*...with homogeneous insurance pools*

Employers may also assist in creating collective pools for old-age and other human capital insurances (such as disability and unemployment insurances) for their workers. By thus keeping the costs of these insurances under control, they improve their position on the labor market and reduce their wage costs. An important factor in determining the type of insurances and the optimal investments of the pension scheme is the type of human capital of the workers and the associated risks and possibilities to absorb risks by adjusting labor supply. This suggests that the pools should be homogeneous in terms of human capital. Moreover, the retirement plans should be closely integrated with human-resource management (HRM) of the employers.

#### **4.7 Increased flexibility in financial planning**

*Optimal risk sharing requires flexible premia*

Flexibility in premium rates allows agents to bear more risks and thus to benefit more from the rewards to risk taking. Indeed, after an expected shock, it is optimal to adjust consumption levels during the rest of one's lifetime. In effect, this involves spreading

the risks over the longest possible recovery period.<sup>25</sup> In effect, if agents feature the same preferences with constant relative risk aversion, optimal risk sharing demands that everybody's consumption declines with the same percentage after a negative shock (over the remaining life time). This implies that the change in premium for the workers should be (as a percentage of the wage) equal to the relative fall in pension benefits paid to the retirees.<sup>26</sup>

#### *Rigid premia reduce welfare and risk taking*

If the contribution rate is fixed a priori and does not respond to shocks, the part of wealth that is dedicated to pre-retirement consumption does not contribute to risk sharing. Indeed, consumption during the working life does not react to wealth shocks at all. Only the part of wealth that is dedicated to post-retirement consumption is exposed to stock-market shocks, which implies sub-optimal risk exposure. Under plausible parameter values, the welfare loss (in terms of the level of certainty equivalent consumption during the entire adult life) of this individual defined-contribution plan is 6.1 % relative to the optimal risk sharing in which individual premia can respond to shocks (see Table 2). Simulations also show that the increased ability to adjust consumption during the working life allows for more risk taking. In particular, in a steady state, a pension scheme that optimally adjusts premia and benefits to shocks can invest 45 % of its financial wealth in risk-bearing assets. In a pension scheme that fixes the premium at an optimal level of 19 % of wage income, in contrast, this portfolio share is cut almost in half to 25 %.<sup>27</sup>

#### *Individual-specific premia*

In order to contain the effects of shocks on pension benefits, pension schemes may thus levy individual-specific pension contributions, depending on the shocks that a specific individual has experienced throughout his or her lifetime. The pension scheme may thus have a substantial exposure to risk without making the pension benefits substantially more risky. The pension scheme may thus ask for a voluntary, individual increase in the premium after an agent has suffered several adverse shocks. Alternatively, it may set such an increase in the premium as a default. In that case, an individual can then always opt out of this premium increase. Giving the individual the option to pay supplementary premia on top of the base premium requires these supplementary premia to be close to actuarially fair. Indeed, this is another reason for marking-to-market the additional pension rights that are being accumulated by paying more contributions (see subsection 4.4).

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<sup>25</sup> The principle of smoothing shocks over the entire lifetime has other implications. With volatile, mean-reverting interest rates, for example, one should adjust the pension rights that are accumulated each year to the level of the interest rate. In this way, one avoids high pension premia if additional pension rights are expensive due to low interest rates. This also benefits macroeconomic stability as aggregate saving does not rise in an economic downturn with low interest rates.

<sup>26</sup> With habit formation, exploiting the long recovery horizon of the young becomes more important. Adjustment of short-run consumption levels then becomes more costly so that most of the adjustment is postponed to when habits have had time to adjust.

<sup>27</sup> A defined-benefit scheme involves a welfare loss of 5.1 % with an portfolio share of 29 % in equity and an optimal fixed benefit level of 72 % of annual wage income. If the pension fund does not take risk at all, the welfare costs are 9.1 % (in terms of certainty equivalent consumption) compared to the first best while the contribution level is fixed at 21 %.

### *Tailor-made policies and their costs*

Allowing members to opt out of their default portfolio choice can further refine the system. Moreover, in setting the default portfolio, one can take into account other characteristics of members besides age -- such as the nature of human capital, the income level, the flexibility of retirement choices implied by the flexibility of the labor market for elderly, and owner-occupied housing and its financing. To illustrate, agents with particularly risky human capital that is strongly correlated with financial-market risks should invest less in risk-bearing assets (see Viceira (2001)). The same holds true for workers that are liquidity constrained, face substantial idiosyncratic human-capital risk, exhibit habit formation, and do not exhibit much flexibility in their retirement choices and thus cannot use the speed and timing of retirement to absorb risks (see Bodie, Merton and Samuelson (1992) and Gollier (2005)). These individual financial planning solutions tend to become more important now that individual life cycles have become more heterogeneous and ICT allows for more tailor-made products. At the same time, the costs of more tailor-made features in collective schemes should be traded off against the associated additional transaction costs and the potential for adverse selection.

### *Pension funds as financial planners*

Pension funds can become financial intermediaries that help individuals with their financial planning over the life cycle. In particular, they can advise workers in accumulating and insuring human and financial capital over the life cycle. This may give rise to competition issues, however, as the provider of collective retirement products has market power on the markets for individual products, like supplementary pensions, additional disability insurance, healthcare and other insurances, mortgages, etc. Public regulation may thus be necessary. For example, a digital infrastructure may have to be set up to facilitate the exchange of standardized financial information between various suppliers of financial services. The suppliers of collective retirement plans thus lose their monopoly on the information about the pension rights of an individual. Indeed, individuals themselves rather than the suppliers of financial services should be the owners of their own digital financial planning register. This creates the potential for more competition in the market for financial services -- even though an individual is forced to participate in the collective pension plan of the sector in which he or she works. As regards the mandatory level of saving, competition on the *wholesale* rather than on the *retail* level is preferred. Hence, whereas participants and members have little freedom of choice, there is substantial competition on the wholesale level for asset management and other services (e.g. on administration and IT).

### *Financial education*

Pension funds can also offer financial education. Advice and education about financial and career planning is an important investment in the human capital of workers, a service that can be especially appreciated by young workers. More freedom of choice will result in greater responsibility for one's choices -- and people should be prepared for that. Better financial education would also allow an increasing fraction of the workforce to use individual pension plans in diversifying their pension portfolios.

Freedom of choice also clearly has its limits, however. In particular, mandatory collective pools for old-age and other insurances for those with similar types of human capital and associated risks reduce transaction costs and adverse

selection. The associated insurance schemes should set sensible defaults for those workers who do not have the expertise or time to choose themselves.

#### **4.8 Improved pension governance**

Restricting individual choice protects financially illiterate individuals with scarce cognitive abilities from making mistakes in complex intertemporal financial decisions under uncertainty, but gives rise to agency issues and problems associated with collective decision-making. Governance arrangements should thus address principal-agent issues that arise if unsophisticated consumers delegate complex financial decisions to professionals. Members should have confidence that the trustees take delegated decisions in the interests of the members so that a certain lack of individual choice remains legitimate. In this connection, the non-profit character of pension funds organized as trusts can bolster the confidence of the participants and members that pension funds act in their interests. Indeed, the members themselves are the shareholders of the pension funds, thereby preventing a conflict of interest between policyholders and shareholders.

Making risk-sharing contracts more complete and limiting discretionary decision-making can alleviate governance problems. Contracts will, however, always remain incomplete -- for example, in specifying investment decisions over a long period. With incomplete contracts, governance rights should depend on residual risk taking. An important challenge is to adjust the governance structure to the newly emerging risk-sharing contracts in which members bear risks in stand-alone pension funds mainly in terms of their pension rights rather than in terms of recovery premia. Rather than those who pay the premium (i.e. employers and/or employees as participants), the members of a pension fund (i.e. those who have pension rights) should have their interests represented in the governing board.<sup>28</sup> If members are residual risk bearers but social partners have a large say in the governing board, then social partners may be tempted to put pressure on the fund to set the price for new pension rights (i.e. the pension contributions) below the market value for these additional rights. The current members in fact pay the associated implicit subsidy on the additional pension rights for participants.

Another challenge is to ensure that management of the funds is conducted in a professional manner. Pension fund trustees and supervisory bodies are not always well equipped to understand complex investment principles and regulations, and to monitor their fund managers adequately. Outside professionals can help in this respect. This calls for a two-tier governance structure for pension funds with, first, a supervisory board or board of trustees representing the interests of members and, second, a professional executive board to deal with the funds' daily operations. The board of trustees should be appointed by a meeting of members.

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<sup>28</sup> Employers, however, are still stakeholders in the pension fund to which their workers belong. In particular, a well-functioning pension fund implies low insurance costs for the workers. This enhances the position of the employer on the labor market, thereby reducing wage costs.

## 5. Conclusions

Several developments affect the future of old-age insurance. Most of these trends -- aging, maturing pension funds, a knowledge economy that thrives on human capital and entrepreneurship, a more flexible labor market in which explicit and implicit taxes become more distortionary -- yield two main implications. First, human capital will become scarcer compared to financial capital. Second (and related), the capacity for absorbing financial risk will decline while the demand for risk taking increases. Whereas safe returns thus decline, risk premia and rewards for investments in human capital increase. Two things therefore become more expensive: security and writing off human capital.

The key challenges for institutional innovation that are produced by these trends are as follows: first, to arrive at new, transparent risk-sharing arrangements, and, second, to stimulate the maintenance of human capital and the flexibility of the labor market so that human capital is exploited better and can more effectively serve as a buffer for absorbing risk; and, third, to better diversify the human capital and financial capital of workers so that emancipated workers become less dependent on the firm for which they work. Endowed with sufficient human and financial capital, adaptable individuals are empowered to embrace the non-verifiable, idiosyncratic risks associated with creative destruction in a dynamic competitive world economy. Making workers less dependent on their employer requires more employable workers through more general human capital, portability of pension rights and less back-loading of pension benefits (see subsection 4.4), and a shift from defined-benefit pension system relying on sponsors to stand-alone pension schemes based on risk sharing through capital markets and intergenerational risk sharing (see subsection 3). Indeed, the two main new securities of workers are, first of all, their employability and the associated capability to adjust to shocks in labor and financial markets and, second, collective stand-alone pension funds with secure individual property rights and adequate defaults that help agents exploit modern capital markets to diversify their investments and engage in efficient financial planning during the life cycle.

While old institutions are crumbling rapidly because governments and companies are withdrawing from their roles as risk sponsors, it will take considerable time to set up new retirement institutions. In the absence of new pension institutions that are better adapted to the modern knowledge economy in which we live, individuals will have a very hard time planning for their retirement. Indeed, more and more evidence emerges around the world suggest that households by themselves cannot implement complex financial planning and must delegate these decisions to institutions.

Dutch pension funds have been evolving in the direction of stand-alone pension funds as an attractive third way between the extensive public pay-as-you-go schemes of continental Europe and the individual pension plans that are increasingly replacing defined-benefit plans in the Anglo-Saxon countries. Among other things, Dutch pension funds are striving make the pension deal more explicit. Moreover, more risks are shifted toward the active working population as the indexation of their rights is made conditional on the performance of the fund. In this way, more risk is absorbed in terms of accumulated pension rights rather than contributions. Finally, the introduction of individual life-course saving accounts allows workers to implement tailor-made solutions based on individual choice.

In the years to come, further gradual reforms will be required to make Dutch collective pension schemes sustainable in view of aging, a more transitional labour

market, and more heterogeneous tastes and needs. In particular, contracts on risk sharing must be made more complete to more clearly define individual property rights; liabilities should be restructured so that young workers should bear more risks in terms of their pension rights rather than recovery premia; back-loading of benefit accumulation should be reduced; the retirement age should be linked to longevity while the labor-market for elderly workers becomes more flexible; individual-specific supplements should be integrated with collective savings; and pension governance should become more professional and adjusted to new risk-sharing contracts in which members rather than participants and employers are the residual risk bearers. Responding sooner rather than later will allow pension reforms to be implemented gradually rather than suddenly. Confidence in stable, credible long-term commitments will thus be maintained, thereby allowing the Dutch pension sector to keep its leading position in the world of pensions.

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## Tables and figures

**Table 1**  
**Pension systems in various countries**

|                       | The Netherlands                | Germany | France | Italy | Spain | Switzerland | UK | US |
|-----------------------|--------------------------------|---------|--------|-------|-------|-------------|----|----|
|                       | % of total retirement benefits |         |        |       |       |             |    |    |
| PAYG public pensions  | 50                             | 85      | 79     | 74    | 92    | 42          | 65 | 45 |
| Occupational pensions | 40                             | 5       | 6      | 1     | 4     | 32          | 25 | 13 |
| Personal pensions     | 10                             | 10      | 15     | 25    | 4     | 26          | 10 | 42 |

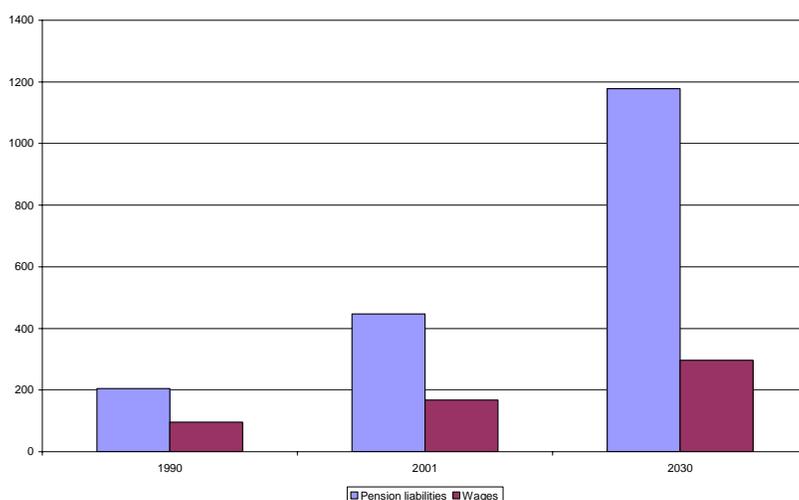
Source: Börsch-Supan (2004)

**Table 2. The welfare effects of various pension schemes**

|   | <i>First best</i> | <i>DC</i> | <i>DB</i> | <i>No risk taking</i> |
|---|-------------------|-----------|-----------|-----------------------|
| Welfare loss compared to first best             | 0%                | 6.1%      | 5.2%      | 9.1%                  |
| Average percentage of assets invested in stocks | 45%               | 25%       | 29%       | 0%                    |
| Optimal contribution level                      | -                 | 19%       | -         | 21%                   |
| Optimal benefit level                           | -                 | -         | 72%       | 79%                   |

Computations are derived on the basis of the model of Teulings and de Vries (2006) and the model parameters are as follows: riskless interest rate 2%, equity premium: 4%, volatility of stock returns: 20%, parameter of risk aversion: 5, rate of time preference: 2%, duration of working period: 40 years, duration of retired period: 20 years.

**Figure 1 Liabilities and premium base of Dutch pension funds, 1990-2030**



Source: CPB Document 67, the Hague, [www.cpb.nl/nl/pub/cpbreeksen/document/67/doc67.pdf](http://www.cpb.nl/nl/pub/cpbreeksen/document/67/doc67.pdf)