

Managing investment risk in defined benefit pension funds:

A comparative study of four countries

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ABSTRACT

This paper inquires into the forces that drive investment strategies and risk management approaches of defined benefit (DB) pension funds in Germany, Netherlands, United Kingdom and the United States in the aftermath of the 'perfect pension storm'. It critically examines the impact of recent changes in the regulatory and accounting environment for pension funds and their sponsors thereby explicitly taking into account the specific governance context in which pension funds are situated. The aim of this research is, first, to provide a better understanding of the investment risk management of DB pension funds thereby contributing to the theory of financial decision-making. Second, by conducting this analysis on a cross-country basis, this research aims at contributing to the comparative analysis of pension funds.

This paper argues that the risk-taking capacity is a central element of DB pension funds. The empirical results suggest that in general risk management has become much more sophisticated but that it is often driven more by regulatory and accounting issues than by the pension fund's specific risk profile. Furthermore, changes to the regulatory and accounting standards increasingly impede the risk-taking capacity of DB pension funds with longstanding detrimental effects on the macro- and microeconomic environment. Eventually the sustainability of the traditional single-company DB pension fund which represents the backbone of the current Anglo-American pension fund system seems questionable. This research draws on in-depth interviews with market participants within the pension fund industry and their advisers.

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1. Introduction

Occupational pension funds operate along a simple mechanism: Contributions are being paid into the fund, which are subsequently invested on the capital markets, and finally paid out in the form of pension benefits. But as the operational variables implied in this process are uncertain, this mechanism is inescapably embedded in risk. Investment returns are uncertain, and this holds true for mortality or salary trends as well. Pension funds are therefore inevitably active risk takers. The two most important risk categories pension funds take are investment and longevity risk. Unlike defined contribution (DC) pension funds, which re-distribute these risks to their participants, defined benefit (DB) pension funds, which give the employee the security of a pre-defined pension benefit, perform their task of providing safe pension benefits by assuming and retaining risk. DB pension funds can become complex risk-sharing institutions, as they may subsequently re-distribute risk between the different groups of stakeholders. The risks pension funds take need to get managed. But managing risk is not equivalent to avoiding risk. This paper argues that the risk-taking capacity is a central element of defined benefit (DB) pension funds. Moreover, this capacity is increasingly impeded by regulatory and accounting standards with longstanding detrimental effects on the macro- and microeconomic environment.

It can be argued that prior to what is generally termed the ‘perfect pension storm’ the risks pension funds took were not particularly well managed. Otherwise this period from 2000 until 2003 with simultaneously falling equity and rising bond prices would not have caused especially Anglo-American pension funds to plunge into unprecedented deficits. Pension funds’ risk management clearly lacked the sophistication with which it is applied for example in the banking industry, where the modern risk management revolution originated in the 1980ies and 1990ies following the Savings & Loans crisis in the United States. Pension funds have been left out of this risk management revolution for a surprisingly long time, although they are large institutional investors, which increasingly impact on the stability of financial markets. Their accumulated assets are equivalent to 125% of GDP in the Netherlands, 100% in the United States and 67% in the United Kingdom (OECD). Pension funds’ investment behaviour is not without implications for the financial markets and is therefore widely academically researched. But it was only the pension funds industry’s sudden turnaround from surplus to deficit during the ‘perfect pension storm’ from 2000 to 2003,

that shifted attention to pension funds' risk management and served as the catalyst for calls for 'better risk management' of pension funds. The large international think tanks started to analyse pension funds' risk management. The International Monetary Fund (IMF) concluded 2004 in an analysis of '*Risk management and the pension fund industry*' that 'policymakers should introduce measures to encourage better risk management practices and to reduce the risk of another cycle of over- and underfunding' (IMF 2004). The Organisation for Economic Cooperation and Development (OECD) conducted a first assessment of pension fund risk management in 2005 concluding that 'after several golden decades of equity investments delivering adequate returns, the topic of risk management has returned to the fore front of the pension industry given the now challenging funding and investment environment' (Stewart 2005). Therefore, one might suggest that the 'perfect pension storm' could prove to be the trigger point for pension funds in terms of risk management equivalent to the Savings & Loans crisis for the banking industry.

The regulating and/or supervising authorities of pension funds have become more sensitive towards risk management. As a general trend, policy makers focus much closer on the funding of pension funds. The shortfall risk is perceived as central risk factor threatening benefit security. Many countries have introduced pension reforms in recent years encouraging higher funding ratios, so that in a balance sheet perspective assets are sufficient to cover liabilities. This holds true especially for Anglo-American regulators, who were traditionally more lenient on pension funds' risk-taking than their continental European counterparts. As was shown by Laboul and Yermo (2006), this distinctly different regulatory approach is deeply rooted in a different conceptualisation of pension funds. Whereas in the Anglo-American world the pension promise is based on the solvability of the plan sponsor, who alone bears investment and longevity risk, the Continental pension fund is itself the guaranteeing institution. The guarantee given by the plan sponsor could be conceptualised as a re-insurance to the pension fund. The legal structures differ accordingly. In continental Europe, pension funds are legally independent companies, usually organised on the model of a life insurance company. The Anglo-American pension fund is mostly organised as a trust. This structure secures the trust's assets but keeps it still closer to the company. Consequently, regulatory authorities in Continental Europe traditionally requested life-insurance style funding buffers at the pension funds as safety measure to secure members benefits¹, whereas Anglo-American regulators pursued a policy of benign neglect towards funding.

The sometimes rigid rules of Continental regulators were often criticised for allowing too little flexibility, but in times of crises they prevented pension funds on the Continent from plunging into deficits comparable to those suffered by their Anglo-American counterparts. The Anglo-American regulatory approach on the other hand proved unsustainable. Both the United Kingdom (The Pensions Act, 2004) and the United States (Pension Protection Act, 2006) imposed pension reforms in recent years requesting

higher funding ratios as additional safety measures. Although the need for action was considerably lower on the continent in terms of crisis management, the Netherlands completely overhauled its regulatory regime and introduced a risk-based supervision thereby taking the lead in applying sophisticated, model-based approaches similar to those used in banking regulation².

In the pension literature the goal of a pension fund is usually described as paying benefits to members. Only rarely is 'funding the pension benefits' constructed as a primary goal in its own right. We share the majority view that it is the ultimate goal of a pension fund to pay the promised pensions to the beneficiaries. A pension fund which is 'fully funded' over its life cycle enhances the chances that the promised benefits can be paid, which becomes relevant in the case of bankruptcy of the plan sponsor. In this view, 'funding' becomes an intermediary target, which could also be conceptualised as an instrument of risk management imposed by the regulating authorities on pension funds. Traditionally, quantitative investment regulations served as an important risk management tool for Continental supervisors, ensuring the 'safe' investment of pension assets, whereas the Anglo-American countries relied on the moral binding impact of fiduciary duty on which the Prudent Person Principle is based (Clark 2006). Quantitative investment regulations were increasingly criticised for producing suboptimal investment results (see e.g. Blake, 1997) and – following the wave of liberalisation of financial markets in the 1990ies – mostly abolished³. Solvency became the core regulatory instrument. More indirect regulatory approaches such as regulating governance became only recently the focus of regulatory attitude, e.g. in the United Kingdom.

It was widely expected that the abolition of quantitative investment regulations would extricate pension funds from all regulatory bias in the formulation of their investment strategy. A quantitative study conducted by the OECD and risklab Germany GmbH showed that this was not the case (Blome 2007). Solvency and accounting rules emerged as important determinants of pension funds' investment strategies.

Clark (2006) theorised the different approaches to pension fund regulation in a triangle between moral, statute and the market, noting that no approach is purely in one angle but usually best depicted by a combination. Accordingly the regulatory approach towards funding could be constructed in a similar triangle with 'moral' representing the trust in the willingness of the employer to fulfil the pension promise which was the traditional Anglo-American approach. Detailed statutory rules which must strictly be adhered to represents the traditional Continental approach. This dichotomy disintegrated into a state of flux. Germany seems to be the only country that stayed with the traditional approach, which can be characterised by imposing risk aversion via detailed regulation. By introducing risk-based funding rules, the Netherlands moved from statute towards market. The United States which had always underpinned the morals by extensive though lax funding rules, further moved towards protection by statute by tightening these rules. In the United Kingdom the regulatory approach remains grounded in trust and moral but

focuses increasingly on the governance structure at pension funds, hence underpinning trust in prudent behaviour by detailing the rules of what actually constitutes prudent behaviour.

At a time when the clarion call is for 'better risk management' of pension funds, there is also a noticeable trend for pension funds in many countries to lower their risk profile. Investment strategies have generally become more risk-averse. This is not without implications for costs or benefits of pension funds, as the return on investment determines to a large extent the costs of supplying a DB pension plan. For example, if a pension fund manages to achieve a stable return of 6% per annum, around 70% of the benefits will be covered by investment returns and only 30% have to be met by direct contributions from the sponsor (McGill 2005). This paper argues that the shift towards lower-risk investment strategies is partly caused by new regulatory and accounting rules. The undesirable macroeconomic consequences of eroding the risk-taking capacity of pension funds were highlighted in a Geneva Report on the World Economy by Boeri et al, stating that restructuring pension funds' portfolio from equity to stocks would result in a world economy with low growth rates and crowding out of private investors by the state (Boeri 2006). Beforehand, the macroeconomic importance of pension funds for the development of capital markets and ultimate ratio the growth potential of the economy was also repeatedly stressed by the European Union in the process of formulating passing and implementing the EU pension fund directive. Critics of this argument have frequently made the point that it is the goal of pension funds to serve the benefits of their members thereby drawing on strong capital market but not creating them. This certainly holds true in a microeconomic perspective. But it can also be argued that the ultimate risk for workers is to have no pension at all. Shifting pension funds' assets into low-risk investments only will lead to either lower pension benefits for members or higher pension costs for sponsor which might cause employers to stop sponsoring pension funds at all.

This research focuses on the impact of governance on the investment decision-making of pension funds in the context of regulation. First, it analyses pension funds' attitude towards risk as it is reflected in investment strategies and risk management concepts and tools that are currently available to and applied by DB pension funds. Second, this paper investigates how regulation impacts pension funds' investment decision-making with regard to risk-taking. This analysis is conducted on a cross-country basis covering four countries, Germany, the Netherlands, the United Kingdom, and the United States. The countries were chosen for significance, the latter three being large established pension fund markets yet representing different concepts, the first for representing a growing pension fund market aiming at increasing the significance of its pension fund system to a level comparable to the other countries.

Pension funds' management of investment is grounded in the relevant context formulated by pension-fund internal factors, such as maturity of plan population, the nature of the pension promise and the funding status, and factors that are outside the sphere of the pension fund which is mainly constituted by regulation

and accounting rules. Governance is usually partly internally determined by the pension fund and partly externally imposed by regulators. Pension fund's risk management will be therefore analysed in this context. This is not a paper on pension fund accounting. As the new accounting rules apply to the sponsor and not directly to the pension fund, the impact of accounting will be analysed in the context of governance, hence how it influences sponsor's attitude towards risk-taking. If the new accounting rules are right or wrong is not the topic here. Neither is it aim of this project to develop a best-practise investment theory or to solve the question of the appropriate level of risk-taking for pension fund, but rather to inquire how governance and regulation produces deviations from what pension funds regard as optimal investment policy based on modern financial economic theory.

This research draws on in-depth interviews with pension fund managers and their consultants. The author is aware of an existing quality-bias as the interviews were in general conducted with the most sophisticated pension funds. In this regard, the findings are not necessarily representative of the overall market but the existing 'best-practice risk management'. The terms regulating and supervising authorities are used interchangeable in this article. In general, the OECD glossary of private pensions is applied with occasional recourses to nationally applied pension terms.

The paper is organised as follows: Section 2 sets out to theorise risk-taking in the context of a pension fund' governance structure. Section 3 intends to give an overview on risk management concepts and tools. The changing strategies of pension investing are explored in section 4. Section 5 gives evidence of current 'best practice risk management' from four countries. Section 6 concludes.

2. A theory of risk taking

How and by whom is the level of investment risk a pension fund takes agreed on? Different modes of risk taking will be developed by means of stylised cases which resemble the current situations in the four analysed countries.

Case I: Final salary plan with strong risk-taking incentives

The employer promises a pension benefit to the employee, which is dependant on salary and years of service. The actuary calculates the pension liability and suggests the contribution rate at which the employer funds the plan. The investment decisions are ultimately made by the employer even though a trustee model may exist, which could be described as weak trustee structure. As the pension promise is not

dependant on the investment returns the employer bears the complete investment risk. When the investment returns are worse than expected, the employer has to make good the shortfall. When the investment returns are better than expected, the employer can reduce or even suspend the annual contribution. In this case, risk and reward is symmetrically distributed, the risk attitude of the decision-maker undistorted.

Now add a Pension Insurance Fund (PIF) to the case: The employer can still benefit from the upside but is insured on the downside. This asymmetric distribution of risk and reward incorporates moral hazard, as has been frequently analysed and documented. In conjunction with weak bankruptcy laws it invites to strategic default and encourages an investment behaviour which can be characterised by ‘gambling for resurrection’, namely the increased risk-taking in a situation of crisis as one can benefit from successful ‘gamble’ but has got ‘nothing to loose’ if the ‘gamble’ goes wrong. This structure incentivises high risk-taking.

Case II: Final salary plan with diffuse risk incentives

The employer promises a pension benefit to the employee, which is dependant on salary and years of service. The actuary calculates the pension liability and sets or suggests the contribution rate at which the employer funds the plan. The employer fully underwrites the pension risk: He must cover all shortfalls. In this case, the investment decisions are made by independent trustees, under what could be termed a strong trustee structure. The trustees are bound by fiduciary duty to take care of the interests of the beneficiaries only, after consultation with the employer. Here, it depends on the specific situation of the pension fund, if trustees are incentivized to take risk.

In the case of an open pension fund sponsored by a financially strong company trustees should be happy to take more risk as the expected higher returns open the potential used to increase pension benefits, thereby serving the members’ interests. Also when the employer reaps the benefits of higher investment returns in form of lower contributions, no harm for the pension fund members can be expected to result from risk-taking. With a strong sponsor, trustees can rely on the plan sponsor’s ability to cover a shortfall.

The opposite can be expected in the case of a closed pension fund sponsored by a financially weak company. Risk taking on behalf of the trustees is not rewarded as the employer cannot be expected to increase members’ benefits. Worse, in case of shortfalls the trustees cannot rely on the sponsor’s ability to cover the deficit. In this constellation pension fund trustees can be expected to implement a risk-averse investment strategy also in conflict with the plan sponsor who has to bear the resulting higher pension costs. According to market participants, LDI strategies were born in such a situation.

The risk averseness of the trustees could be expected to be overcome by introducing a Pension Insurance Fund. But this is not necessarily the case, as PIF usually caps pension benefits so that members are always worse off when being taken over by the PIF in case of the sponsor's bankruptcy.

Case III: Average pension plan with symmetric risk-reward distribution

The employer is mandated to contribute $x\%$ of her employees' salary to a pension fund. The guaranteed pension covers only the sum of the paid in contributions. Investment risk is shared between employer and employee. The employee benefits from good investment returns as the pension benefits are then indexed in line with inflation. In case of insufficient investment returns indexation is suspended. The employer still underwrites the shortfall risk, but can also benefit from strong investment returns as investment returns which exceed what is required for indexation can be recovered in form of lower contributions. The investment decision is taken by trustees, which have to consider the interests of all stakeholders (CHECK). As risks and rewards are symmetrically distributed, the risk attitude is not distorted.

The same holds true if the employer opts out of the risk-sharing mechanism. She still contributes the mandated contribution to the pension fund does not cover the shortfall risk any more. In return, she also abandons the right to recover the surplus. The risk sharing is now confined to the collective of active and retired members, but the symmetry of risk and reward maintained. This case represents a highly stylized version of the new Collective Defined Contribution (CDC) plans in the Netherlands.

Case IV: Hybrid pension plan with diffuse risk incentives

Many different forms of hybrid pension plans exist especially in continental Europe. As in average salary plans with optional indexation, the essential characteristic of hybrid plans is the sharing of investment risk between employer and employee. It mostly covers DC-style plans with additional return guarantees. Let us outline the following cases:

Let IV.a be a case, where the employer promises a future pension which is dependant on contributions, which are fixed in absolute terms, and the years of service. The pension benefit is projected based on actuarial assumptions. It consists of a minimum benefit guaranteed by the employer and an additional benefit subject to higher than calculated investment returns. The employer fully underwrites the downfall risk. Let us assume a weak trustee structure with the employer de facto making the investment decisions. If higher than calculated investment returns are shared between employees and employer, the employer's risk

profile is still neutral. If all returns are used to enhance member's benefit, the employer is discouraged from taking on investment risk.

In case IV.b the employer offers the employee the possibility to convert part of her salary into a future pension. The pension benefit is projected based on actuarial assumptions. It is not guaranteed but depends on the investment returns. The difference to a pure DC plan is that the employer guarantees a minimum return on the paid-in contributions. The investment decisions are made by the employer. The employee benefits from higher than expected investment returns and is shielded from the downside, whereas the employer has the risk of extra contributions in case of adverse investment results but cannot reap the upside. In this constellation, the employer is clearly dis-incentivized from risk taking.

3. Risk management for pension funds

This section intends to give an overview on the development of risk management at pension funds, including restrictions being imposed on pension funds by regulating authorities and accounting bodies as well as the governance of the decision-making process, thereby distinguishing between the sphere of the pension fund and the sphere of the plan sponsor. Following Kocken, a broad definition of risk management is applied, which includes the process of decision-making regarding the risk-return trade-off and stakeholders' goals in addition to the usually applied definition which focuses on risk control only (Kocken 2006).

3.1. Measuring risk – from the actuarial valuation to fair value

The valuation of pension funds is the task of the actuary. Traditionally, assets and liabilities were measured by the actuarial approach, which focused on the stability of the contribution rate for the employer. Rather than putting the spotlight on current market values, the actuarial approach applied smoothing mechanisms for the sake of long-term stability of the pension funds' variables. At Anglo-American pension funds, assets and liabilities were discounted by the expected return on assets, which would be derived from the asset portfolio mix. Other jurisdictions applied nominal or book values for the assets and used a fixed discount rate for the liabilities thereby approximating the expected portfolio return. The values were therefore heavily smoothed with the consequence, as one market participant put it: *'In the old actuarial valuation we could trust that any deficit would just vanish.'* In this world, the corporate sponsor of a

pension fund was almost completely shielded from market risk in the pension fund. Balance-sheet risk, namely the risk of unplanned deficits in the sponsor's balance sheet triggered by financial market volatility, was not a relevant risk category for corporate sponsors. Also, the same methodology of measuring assets and liabilities were applied by the pension fund, its sponsor and the regulating authorities and accounting standards setting bodies.

This world changed dramatically with the introduction of accounting standards for the corporate plan sponsor that were based on the 'balance-sheet approach'. In line with economic finance theory assets are now valued at market prices and liabilities with the yield of the 'replicating asset' which is defined as the zero-coupon structure of Government bonds or – less sophisticated – as the yield of BBB corporate bonds. This new approach had twofold consequences: The value of the asset portfolio declined in all instances, when the slide in equity prices was not compensated by an increase in bond prices (which is the case for the vast majority of pension funds) and at the same time liabilities soared due to the decline in market rates and also became much more volatile. (For a discussion of the accounting standards see e.g. (Whittington 2006)). Balance-sheet risk became a relevant risk category for corporate pension fund sponsors.

This move by the accounting standard setting bodies breached the uniformity of the methodology of measuring values and therefore risks: The Anglo-American pension funds mostly still apply the actuarial approach for their own accounting but have to provide fair valuations to their sponsors. The same applies to German pension funds whose accounting system, which is described by the regulatory authority, is rooted in book valuation, whereas the corporate sponsor usually has to apply IFRS accounting at fair values. The application of various valuation methodologies creates a dilemma for risk management as the management objective becomes ambiguous (see Blome et al for further discussion (Blome 2007)). In these cases, a hierarchy of values is required but not supplied. The Dutch Central Bank is up to now the only pension fund supervising authority who fully implemented the fair value principle in the new regulatory framework.

3.2. Managing risk - from 'asset only' to sophisticated ALM

Traditionally, in the context of Anglo-American pension funds risk management was defined as a task of the asset allocation only (Blake 2003). Modern portfolio theory concepts were increasingly used in deriving the strategic asset allocation (SAA) and managing investment risk, although these concepts arrived with considerable time-lag at pension funds and were usually not applied with the same rigour as in the banking industry. But there was usually no link to the liabilities.

Other pension fund communities, notably the Dutch research cluster, tend to equate risk management with asset liability management, thereby (1) giving equal concern to both sides of the balance sheet and (2) integrating the management of assets and liabilities in a consistent framework. Today, the use of Asset-Liability-Management (ALM) is established market practice in all analysed countries. More recently, risk analysis started to include extreme risk analysis in analysing 'fat tails' and expand into risk budgeting approaches. Rahl describes risk management as a 'journey', as a 'lifetime's odyssey' rather than a 'one-time exercise'. Concepts and instruments have become increasingly sophisticated driven by improvements in technologies and an increased risk awareness on behalf of fiduciaries (Rahl 2000).

VaR is increasingly used as a risk measure at pension funds embedded in a risk budgeting approach. Risk Metrics extended its toolset to pension funds in 2005. Here, it is calculated over a period of one year to meet the requirements of pension funds' long-term investment horizon. Also the confidence interval applied is usually lower. Still, when transferring a tool which was developed for the banking industry to the pension fund industry several points need to be considered: Banks are regulated because of the systemic risk they pose to financial stability (see e.g. Goodhart (Goodhart 1998)). A 'run' on the bank is the worst-case scenario regulators try to avoid. The concept of the bank's capital is employed to provide the buffer against unfavourable and unsystematic events. This concept does not apply for pension funds: Pension funds are merely structures which accumulate contributions and investment returns in order to pay pension benefits at a later stage. In most jurisdictions, pension funds have no capital. They also do not have customers who 'can run away'. In most cases, the employee contracts out of the pension agreement by terminating employment. But even then does the contributed capital stay with the pension fund [this might get changed by the upcoming EU portability directive]. VaR can be a useful information tool for the pension fund management, but it is questionable whether it represents a suitable management tool.

Traditionally, investment managers are controlled via the tracking error, which calculates in a symmetric way the risk of an investment manager missing the benchmark, thus including the risk of underperformance as well as the chance of outperformance, what is generally termed 'producing alpha'. As the chance of outperformance is in general created by higher risk taking, tracking error can also be applied in risk budgeting. The pension fund allocates a strategically defined risk budget in a first step among asset classes and subsequently among the single investment managers. Each investment manager gets a tracking error compared to the chosen benchmark. The pension fund monitors the investment manager in terms of both performance and risk taking. The pension fund naturally gets alarmed, when the investment manager overshoots the tracking error and thus the allocated risk budget. But the pension fund is equally concerned with an investment manager, who does not utilise the allocated tracking error, which means not taking sufficient risk and thus reducing the chance of producing alpha. Risk budgeting via tracking error

represents a convenient concept for both the pension fund and the investment manager, as it allows the investment manager to stay in the familiar surroundings of the benchmark concept and the pension fund benefits from risk control being based on uncomplicated calculations.

More recently, the arrival of the fair value principle at the doorsteps of pension funds further challenges the traditionally applied risk management tools. Starting in the Dutch pension fund community, the large pension funds overhauled their ALM tools. By implementing option pricing models based on state prices, stakeholders' risk preferences can be addressed endogenously in the ALM process. Kortleve et al showed that the explicit consideration of risk changes the attractiveness of strategic pension policies. Thus, the fair value approach usually leads to a lower risk profile (Kortleve 2006). Ponds concludes: 'One way or another, fair-value accounting will lead to higher funding costs of pensions'. (Ponds 2007).

3.3. Regulating risk management

Pension fund regulation forms a further risk taking determining factor. The investment process is embedded in the distinct regulatory framework. The regulatory environment is a key determinant for pension fund management (Fabozzi, 2005). Direct quantitative investment regulations limiting pension fund's investments in as 'risky' perceived asset classes are the most obvious factor. But as most countries have shifted the qualitative prudent person or prudent expert rule, this type of regulation has become less important in practical risk management. Solvency regulation governing the funding policy of a pension fund are much more central-stage today. As was shown in an ALM optimisation exercise (Blome 2007) strict funding rules have a strong impact on the choice of the investment portfolio. They tend to incentivise low-risk, low-yield investment which in turn increases the net funding costs for the plan sponsor or lowers potential pension payments for beneficiaries.

The current discussion in the United Kingdom and the United States highlights the difficulties surrounding the concept of 'funding'. Nobody would disagree, that it is a good thing to have 'fully funded' pensions. Funding of the pension liability in a segregated vehicle shielded from recourse by the company is the fundamental security underpinning members' benefits. A 'fully funded' pension ensures that benefits can be paid even when the sponsoring company becomes bankrupt. But there are some caveats. First, it is difficult to define 'full funding'. Pension assets are usually easy to value as they are mostly traded on liquid markets where prices are available. Pension liabilities on the other hand tend to be uncertain, which holds true especially under an Anglo-Saxon DB pension promise, as neither salary nor mortality trends are

known variables. De Jong showed that it is not possible to value pension liabilities in incomplete markets as they exist in the real world (de Jong 2005). Although, mathematical iterations can be found to cope with the challenges, the valuation of pension liabilities remains in a certain way constructed. Second, general acceptance of valuation methods therefore rests on stakeholders' consent. Whereas in Germany and the Netherlands the interpretation of funding which is formulated by the regulating authority is generally accepted by the pension fund community, this is not generally the case in the Anglo-American countries. The concept of funding seems to be a highly controversial and partly contested area.

Steering risk management systems to the goal of 'fully funded' pension liabilities is therefore, in a sense, obnoxious. As one market participant put it: *'I do not know my liabilities. I am here to meet my liabilities, not to match.'* Furthermore, any change of definition will lead to the sudden genesis of deficits or surpluses as was shown with the implementation of the new accounting standards. This argument calls for flexible funding approaches. One might suggest that closer look at bankruptcy laws might also be helpful to increase the safety of the pension promise.

4. The changing paradigm of pension investing

Investment is a core function of pension funds (Davis 2001). The investment return on pension funds' assets determines the costs for providing a *defined-benefit* pension plan. Pension funds take investment risk by investing in assets which prices and returns are subject to changes. Financial economic theory measures risk as volatility and irrevocably links risk to return: The higher the risk taken the higher the expected return. Equity is associated with higher risk and higher returns than bonds. The common notion is that investors with a long investment horizon can take more risk than short-term investors in the expectation of getting rewarded by higher returns. As pension funds are usually conceptualised as long-term institutional investors, common wisdom expects them to be large equity investors. This holds true for the United Kingdom and the United States, where pension funds' equity holdings account for nearly half of the market capitalisation. In Germany, this figure is below 20%, but still significant. Thereby, pension funds perform the important macroeconomic task of providing real capital. Pension funds' risk taking capacity can therefore be regarded as significant for the functioning of capital market economies (Boeri 2006).

The 'perfect pension storm' at the turn of the century with simultaneously falling equity prices and bond yields challenged the wisdom of the conventional investment strategies and risk management techniques of pension funds (Ambachtsheer 2005). The traditional static 60:40 portfolio mix of equities and bonds⁴ was not able to cope with the exceptionally strong stock market fall from 2000-2003.

Practice on investment strategies and Strategic Asset Allocation (SAA) varies across the US, UK and Europe. Whereas the old balanced mandate with 70:30 – in an UK context – or 60:40 – in an US context – asset split on equity and bonds, has clearly fallen out of favour in the UK, it seems to be still widespread in the US. UK pension funds shifted towards specialised mandates with a stronger emphasis on long-duration bonds. The pension funds in the Netherlands seem to have stayed in their 40:40 SAA, with the large pension funds investing the remaining 20% of their portfolio stronger in alternatives.

There seem to be two more general trends in the market:

- The link between assets and liabilities has increased, which triggered a more widespread use of Asset-Liability-Modelling (ALM) techniques.
- Pension funds invest increasingly in alternatives. The professional players seem to have the superior risk management systems in place focusing increasingly on the analysis of ‘fat tails’⁵.

With the maturing of pension funds, liabilities have become more important for the formulation of the investment strategy. ALM techniques are common in the market nowadays, although the sophistication of ALM studies varies strongly. Liability-Driven-Investment (LDI) strategies are the ‘new kid on the street’. The understanding of LDI varies significantly. A study by JPMorgan Asset Management on LDI (Franceries 2006) showed, that on the Continent there is often an understanding of LDI in the sense of applying the results of an ALM exercise. The market participants in the UK regard LDI more often as a liability immunising strategy. Liabilities are taken as the benchmark for the asset allocation, interest-rate and inflation risk are hedged by matching either cash flows of pension assets and liabilities or their duration. The first rather crude LDI strategies matched the duration of the assets and liabilities by shifting the complete portfolio into bonds (the best known example is the Boot Pension Scheme). Today, duration baskets are available created with interest-rate swaps. Most funds hedge only part of their liabilities, so as to leave room for outperformance. One also has to be careful in assessing the risk of the pension liability. The degree of certainty with which the actuaries calculate the cash flows of the pension liability diminishes as the time horizon increases. One pension investment consultant conceded: *‘There are a number of reasons why your cash flows are going to be imprecise and that is why a precise solution to an imprecise problem seems like sort of overkill’*. Therefore, pension funds often hedge the cash flows of the next 10 to 20 years depending on the individual pension funds’ maturity and shift the remaining part of the portfolio into what is termed ‘return-seeking assets’, which consist of equity as the traditional asset class and the alternative asset classes, which – in the UK – also include property. Applying a LDI strategy in this respect does not necessarily reduce risk, but it distributes risk in different ways and can also imply actually increasing the risk of the portfolio. Nevertheless, such strategies may present a balanced compromise

between the interest of the different stakeholders, but the high degree of investment sophistication clearly requires sound governance structures at the pension funds.

5. Evidence from four countries

This section aims at giving an overview of the different pension fund systems in Germany, the Netherlands, the United Kingdom and the United States. Each section starts by giving a short overview of the main characteristics of the pension fund market, followed by chapters on the funding status, governance structure, pension plan design and regulation. Finally, it is analysed how these factors impact investment strategies and risk management.

5.1. Germany

5.1.1. Context

The German market for occupational pension provision amounts to EUR 381bn (aba 2004), which corresponds to 17% of GDP and renders it by far the smallest of the four analysed countries. But the German Pension Reform, which was implemented from 2002 onwards, seems to have succeeded in enhancing the relative importance of occupational pension provision for total old age income thus compensating the reduction in the state-provided pension benefits. Not yet clearly noticeable in the volume of invested pension assets, the proliferation of occupational pension increased from an estimated 52% in 2001 to 65% of employees in the private and public sector in December 2006 (TNS 2007).

For Germany, this research focuses on 'Pensionskasse' only, as this is the most relevant and best documented funding vehicle in Germany: 153 'Pensionskasse' managed assets of EUR 92bn in 2005 (Bundesanstalt fuer Finanzdienstleistungsaufsicht 2006). It is not surprising, that 'Pensionskasse' are on average with 21.6 pensioners per 100 active members the most immature pension funds of the here analysed countries.

The reader should bear in mind that the 'Pensionskasse' is just one in five available vehicles and accounts for about a quarter of the German market for occupational pension provision. The 'direct pension promise', where the pension liability was traditionally not separately funded and pension benefits were paid from the sponsoring company's cash flow, is still the dominating vehicle accounting for over 50% of occupational pension provisions. These 'direct pension promises' are nowadays increasingly funded: Companies irrevocably dedicate assets to the pension liabilities, in order to avoid having what is termed 'unfunded pension liabilities' by accountants on their balance sheet. But companies usually do not use one of the

existing regulated vehicles for that purpose but establish so-called ‘Contractual Trust Agreements’ (CTA), which are purely legal structures, unconnected to occupational pensions and therefore not regulated by the German pensions regulator. There is no official statistic on the use of CTA’s, but building on companies’ announcements it could be very roughly estimated to have about the same volume in terms of assets under management as the ‘Pensionskasse’. This implies that two pension-fund like structures exist in Germany, one whose investment is heavily regulated, and one with completely unregulated investment and risk management⁶. Comparative research into companies’ decision-making regarding the choice of the funding vehicle and also the decision-making in these vehicles could provide valuable insights into the impact of regulation, but is beyond the scope of this research.

5.1.2.Funding Status

As German pension funds are legally prevented from building up a high equity exposure and are requested to be well funded, the impact of the equity market downturn was not as significant as e.g. in the United Kingdom. The subsequent fall in bond market yields lowering the returns on the dominating fixed income portfolio in many cases below the absolute return requirements was for many ‘Pensionskasse’ a more urgent challenge they had to cope with. The German regulatory agency qualified German pension funds as being in good financial condition (Bundesanstalt fuer Finanzdienstleistungsaufsicht 2006). Hidden losses that occurred at a number of pension funds in the aftermath of the ‘perfect pension storm’ were regained. But many pension funds were prevented from benefitting from the favourable stock market trends from 2003 onwards thus limiting the return potential.

5.1.3.Governance Structure

A ‘Pensionskasse’ is organised in the legal form of an independent life insurance company. It can serve one or more employers. Traditionally, ‘Pensionskasse’ were operated by the sponsoring company or groups of companies. More recently, following the German Pension Reform in 2001, also financial service providers started operating ‘Pensionskasse’ on a for-profit basis. Also, trade unions and employer associations mostly established ‘Pensionskasse’ as vehicle for the industry-wide pension provisions, which were established following the new German pension law. In terms of assets under management, company ‘Pensionskasse’ dominate the market. They are usually organised in the form of a mutual society. Insurance law regulates the necessary bodies: The ‘Pensionskasse’ is run by a management board consisting of at least two managing directors supervised by the supervisory board with equal representation of employers and employees. The senior representative body is the assembly of members. The

memorandum and articles of the association specify how these bodies are established (Bundesanstalt fuer Finanzdienstleistungsaufsicht 2005). The supervisory board is usually responsible for setting the strategic investment policy, the management board for its implementation. German 'Pensionskasse' operate as professional pension fund management companies, with a full staff managing in-house pension administration, investment, risk management and reporting. The influence of consultants is therefore relatively low. The large 'Pensionskasse' manage the complete pension investment process including manager selection in-house. Most 'Pensionskasse' pursue a mix of in-house and outsourced investment: Bond investment is mostly done in-house, whereas more research-intensive asset classes as for example emerging markets are outsourced to external investment fund managers. The exact apportioning is closely linked to the size of the pension fund.

There are today very different models regarding the degree of separation between the sponsor and the 'Pensionskasse'. Some companies operate their 'Pensionskasse' as in-house undertakings from their finance and human resources departments. In these cases, the sponsoring company is strongly involved in the decision-making on the strategic investment policy, they set the guidelines. As a pension consultant put it: 'In Germany, it is difficult to distinguish between the company and the trustees'. In this model, there is strong involvement and commitment of the company. Companies are usually more inclined to take investment risk in their 'Pensionskasse'.

Other companies seek greater separation from their pension funds. Especially when the sponsor disintegrates into a fragmented group of companies on the market for corporate control, the 'Pensionskasse' can become a truly independent company and might also be opened to for-profit third party business. The 'Pensionskasse' can be operated as a core business of the company group with a risk and return budget set by the mother company. In this case, regress to the sponsor's covenant is still a legal provision but not any longer a relevant option for the pension fund's strategic policy.

5.1.4. Pension Plan Design

German pension plans are mostly hybrid. Pure DC plans are legally not permitted⁷, pure DB plans are becoming increasingly rare. The dominating plan type for new contracts is a 'contribution orientated' DB plan ('Beitragsorientierte Leistungszusage'), which is quite close to the cash balance plans in the US. It is basically an average salary plan, where the employer guarantees a pension benefit based on fixed contributions. The pension benefit is calculated according to actuarial rules. As the calculation of this pension benefit is based on very conservative estimates, the promised pension benefit is actually a minimum benefit, which usually gets topped up by surplus benefits. In general, benefits must be indexed in Germany. Every three years, the employer must check, if the purchasing power of the benefit is still in line with the originally promised benefit and, if necessary and economically viable for the sponsoring

company, adjust the benefit in line with the increase of the consumer price index or net wages. Alternatively, the employer can increase the pension benefits automatically by 1% per year. The 'Pensionskasse' can exempt from the indexation rules, if all pro rata surpluses are used to increase the benefits of the pensioners.

Like life insurance companies, 'Pensionskassen' guarantee a fixed minimum rate of return per annum on the paid in contributions during the accrual phase. 'Pensionskasse' generally determine the level of guaranteed interest rate up to a cap, which is fixed by the Ministry of Finance in relation to the yield of long-term Government bonds (2.25% since January 2007). The guaranteed interest rate applies for the entire life of a contract. As this maximum interest rate guarantee was subsequently lowered over the last years following the decline in market rates, many 'Pensionskasse' still have contracts in their books with guaranteed returns of 4% per annum or more. The liabilities of 'Pensionskasse' therefore follow long-term bond-yields, but - given the long-term nature of pension contracts - with a significant time-lag. The total pension benefit paid by a 'Pensionskasse' consists of the guaranteed benefit and the surplus benefit, which depends on the return of investment.

The second new plan type, which was introduced in 2001, is a DC plan with additional guarantees for the employee ('Beitragszusage mit Mindestleistung'). The investment risk is shared between employer and employee, as the employee is sheltered by a nominal guarantee of the contributions paid in (less disbursements for the cover of biometric risks). Here, indexation of benefits is not required.

Quite often, the pension plan includes options regarding the level of required contributions and/or guaranteed benefits. The 'Pensionskasse' can then either increase contributions or decrease benefits in case of severe economic problems. Today, most 'Pensionskasse' offer a variety of pension plans with different benefit structures employers and/or employees can choose from.

5.1.5.Regulation

German pension funds are regulated and supervised by the insurance division of the Federal Financial Supervisory Authority ('BaFin'), which operates since 2002 as integrated supervisor for banks and financial service provider, insurance companies and securities trading. The 'BaFin' pursues a risk-orientated regulatory approach. German 'Pensionskasse' are subject to strict funding rules. 'Pensionskasse' must be constantly funded at 104.5% of its technical reserves, it is technically insolvent at a funding level below 100%. 'Pensionskasse' are discouraged from risk-taking. First priority is given to the safety of investments. Pension funds are legally prevented from investing in assets which are rated by the large rating agencies below investment-grade⁸. The regulator's investment principles further demand

investments to yield a positive rate of return, to be liquid, and to be well diversified by asset class and debtor. The investment principles are outlined by law ('Versicherungsaufsichtsgesetz') and detailed by 'circulars' which are decreed by the regulator. These 'circulars' are legally binding.

German 'Pensionskasse' are the only pension funds (of the here analysed countries), which must adhere to quantitative investment rules, which are applied in two steps. First, the regulator defines the investment universe by specifying the asset classes 'Pensionskasse' are allowed to invest in. Market participants criticised the regulatory authority for reacting too slowly to market innovations thus preventing 'Pensionskasse' from capitalising on first-mover opportunities. For example, investments in hedge funds were allowed only in 2004 with a limit of 5% of total assets ('Sicherungsvermogen'). Investment in commodities, which became a new alternative asset class for pension funds in the Anglo-American countries and the Netherlands a few years ago, is still not allowed.

Second, the regulator imposes limits in relation to the assets under management for the maximum investment per asset class or group of asset classes, thus legally prescribing and to a certain extent detailing the diversification principle which is central to modern investment theory. The most important quantitative investment limit is the general quote of maximum 35% 'risk-taking assets'. 'Pensionskasse' may invest up to 35% of assets in so-called 'risk-taking assets' which comprises asset classes with highly divers risk profiles as it includes listed equity as well as hedge funds and high-yield investments. The pension fund's individual risk taking capability determines the extent to which investments in risk-taking assets are regarded as suitable, which in turns depends on the extent of reserve buffers or the implementation of hedge strategies. In this respect, German regulation is case-based and risk-orientated. Further quantitative investment rules include the postulation that not more than 5% of the portfolio may be invested with the same debtor. This quota increases to 30% in case of German public authorities, international organisations and qualified banks. Investments in currencies other than the Euro are closely limited as, firstly, at least 80% of the assets must be invested in the same currency in which the liabilities are denominated, and, secondly, assets have generally to be invested in the same country where the liability was generated. All quotas are calculated on nominal or book-value basis, thereby allowing for a more stable investment policy as the portfolio does not need to be rebalanced following capital market volatility. It also allows for the building up of hidden reserves.

5.1.6. Investment Strategies

As German regulation is very strict on funding, the primary investment goal is to avoid shortfall risk in the funding level. As liabilities are valuated at a fixed discount rate which is also the guaranteed rate of return

on contributions, assets have to grow at least at the same pace to keep the funding level in line. Therefore, 'Pensionskasse' pursue an absolute return target as secondary investment goal. '4% + x' represents a commonly formulated investment goal, with the 4% being the prevailing discount rate, the 'x' resulting from the regulator's demand to increase capital and from the need to enhance mortality.

German 'Pensionskasse' are conservative and risk-averse investors. The maximum investment limit of 35% for 'risk-taking assets', e.g. equity, profit participation rights or hedge funds, was used to only 18% in 2005 (Bundesanstalt fuer Finanzdienstleistungsaufsicht 2006). Equities are the main source of risk-taking assets. Hedge funds added 0.3%-points and high-yield investment 0.5%-points to the risk-quota. Most of the hedge funds investment constitutes indirect investment via structured products with the return linked to underlying hedge funds.

The investment behaviour of 'Pensionskasse' is similar to that of life insurance companies, which is not surprising given the identical legal structure and regulation. The traditional investment strategy is to pursue a buy-and-hold strategy with registered, not-quoted bonds or loans issued by banks or the Government. It is regarded as a low-risk strategy, as losses on the balance sheet that would incur to quoted bonds in times of rising yields as bond prices fall can be avoided as marked-to-market valuations do not have to be applied to these registered, not-quoted bonds. Also, this investment strategy fits well into the nominal value orientated German regulatory context. Of the in this research analysed countries, German pension funds are the only ones which have to apply nominal values to assets and a fixed discount rate to the liabilities. This valuation methodology smoothes out capital market volatility in a way which is comparable to the traditional actuarial approach common in the Anglo-American countries. But apart from being a low-yield strategy, this investment strategy can bear significant liquidity risks when assets need to be sold in times of rising capital market yields thus realising hidden losses. Implementing core-satellite strategies is the first step out of the traditional investing, thus benefiting from the positive diversification of assets with low correlation. The dominating asset classes are clearly bonds and equity; only the larger and more sophisticated 'Pensionskasse' have started to invest in alternative asset classes, such as hedge funds and private equity. Liability immunising strategies are not common in Germany.

A common investment approach is to stay in the fixed income investment but to enhance yield by buying into structured products, which are synthetic investment instruments created by investment banks. The kind of investments that appeal to 'Pensionskasse' usually uses bonds as underlying combining them with derivatives thereby creating bond-like instruments with returns higher than bonds or with cash-flows that better match the investor's cash need. Examples are multi-callable bonds, which offer a higher return in

exchange for a cash-flow risk or reinvestment risk. 'Pensionskasse' invest in structured products within their strategic bond allocation. It can amount up to 25% of the overall portfolio.

Some 'Pensionskasse' have also started to invest in collateralised debt obligations (CDO). Their charm is, as one market participant put it *'to offer the return of equity at bond-like volatility'*. As asset-backed securities (ABS) account for about a third of the collateral backing CDOs (BIS 2007), these structured instrument may provide a channel for the spill over of the problems in the US subprime mortgage market into German 'Pensionskasse'.

This is a clear indication of regulation-induced sub-optimal investment. 'Pensionskasse' are in a dilemma, which was especially problematic during the low-yield phase from 2003 up to end 2006: In order to fulfil their pension obligations they need annual investment returns at or above the guaranteed return, which was significantly above the risk-free return of long-term government bonds. This implies the need to take investment risk. But as they are prevented from openly taking investment risk by investing in highly liquid equities priced on public stock exchanges in a transparent and competitive way, they try to capture risk premiums in a more discreet way by investing in asset classes which are either illiquid or with opaque pricing mechanisms or both.

Nearly all interviewees stated that their investment portfolio would look very differently in the absence of regulation. Most would like to have a higher exposure to equity, all would like to be able to react earlier to new investment topics. Depending on the individual specifications of the pension fund regarding maturity of plan population or regress to the sponsor's covenant, pension funds would not necessarily take more risk but would take risk from different sources in a way they deemed to be more efficient.

5.1.7. Risk Management

In Germany, risk-management is outlined by the regulatory authority in some detail. Risk management is clearly regulation driven. The requirements pension funds have to meet include requirements regarding

- Asset-Liability-Management
- Stress-test
- Internal organisation and revision.

With the 'circular 15/2005', Asset-Liability-Management (ALM) became implicitly legally required. The circular states that insurance companies (including pension funds) have to decide on their strategic asset allocation within the specific context of their liabilities. A detailed analysis of the risks involved in assets and liabilities and their relation (ALM) is therefore an important precondition for the formulation and

implementation of the investment policy. The ALM studies have to stress-test the investment policy in a range of different capital market scenarios. Methodology, assumptions and results have to be reported to the regulator (Bundesanstalt fuer Finanzdienstleistungsaufsicht 2005).

The most important risk management tool is the stress test imposed by the regulator, which is basically a tool to analyse the impact of negative developments of capital markets on the portfolio with a one-year horizon. The 'BaFin' conceptualises the stress-test as an important quantitative risk management instrument which acts as early-warning system. The stress-test questions if the pension fund still fulfils the solvability requirements, i.e. funding level above 100%, in certain pre-defined negative scenarios for equity and bond markets. The 'Pensionskasse' must pass the stress-tests, otherwise the regulator could demand changes to the investment policy or even close the pension fund. In 2006, a fourth stress-test was added to the already existing three different stress tests including a negative trend on the property markets. The four tests are specified in table 1:

(insert table 1 here)

Market participants cited the stress-tests as the main reason why the quota of 35% for 'risk-taking assets' never gets fully tapped. It shortens the investment horizon of 'Pensionskasse' to a period of one year maximum and thus prevents German pension funds from benefiting from the opportunities of long-term investing. It is a pro-cyclical tool as cyclical downswings in the equity market can force pension funds to sell equity in order to pass the stress-test instead of benefiting from the opportunity volatility offers to long-term investors. Especially in the aftermath of the 'perfect pension storms' when hidden reserves were exploited and often turned into hidden losses, many pension funds were rumoured to have been forced to sell equities, thus realising losses.

Furthermore, the regulating authority details internal operation and control and revision processes, also specifying which actors at the pension funds are responsible for which tasks. This prompted large 'Pensionskasse' to compile detailed 'risk management handbooks' outlining the complete risk management process from the ALM to the reporting.

Regulation thus firmly anchored ALM in the German market. ALM studies are usually conducted by consultants. The leading 'Pensionskasse' is implementing their own ALM tool not only for deriving the SAA but also to simulate pension policy decisions in a way that is comparable to the market practice in the Netherlands. But often ALM studies lack sophistication. The gap between the leading and the lagging pension funds seems to be quite high. Therefore, it is not surprising that some market participants describe the stringency between the ALM study and the decision-making as relatively low, whereas other pension

funds cite ALM as the most important strategic management instrument. Risk budgeting is not common in Germany.

5.2. Netherlands

5.2.1. Context

With EUR 627bn pension assets under management representing 125% of GDP end 2005, the Netherlands has the largest pension fund market relative to its economy of all OECD countries (OECD). With 49 pensioners per active members the market is relative mature. In 2005, 695 pension funds provided pension benefits, thereof 103 industry-wide pension funds, which are mostly mandatory for the employees in a specific industry, 581 company pension funds⁹ serving the employees of a single employer, and 11 company pension funds, that cover the members of specific professions (DNB 2006). The industry-wide pension funds dominate the market holding 70% of all pension assets and covering approximately 85% of active members. For a recent overview of the Dutch pension system see e.g. Ponds and van Riel (Ponds 2007). The two largest pension funds, ABP, the pension fund for the public sector (privatised in 1996), and PGGM, which covers the employees in the healthcare and social work sector, alone account for about 40% of the Dutch pension fund market, managing EUR 191bn and EUR 71bn respectively end 2005. Apart from these giants, the market is surprisingly fragmented. On average, the 581 company pension funds manage just above EUR 300m, and the industry-wide pension funds – apart from ABP and PGGM – around EUR1.5bn. The market consolidation at the level of smaller funds, which is noticeable since 2001, when there were still 754 company pension funds in the Netherlands, accelerated 2005 with their number shrinking by a further 50 funds. These funds are mostly bought-out by insurance companies. But also larger funds, which retain their legal structure, efficiently transfer the management of the pension funds to professional pension fund management companies, under an arrangement which is termed ‘fiduciary management’.

5.2.2. Funding Status

Dutch pension funds have steadily recovered from the period 2000-2003 when the stock market was in the doldrums due to continuously high returns increasing assets. The nominal coverage ratio, which refers to the guaranteed liabilities only, increased to 125% end 2005, the highest level since 2001. But also in real terms, thereby allowing for inflation-indexing, the Dutch pension funds are well above 100% funded. This enabled nearly all Dutch pension funds to resume the full indexing of accruals and benefits in 2006.

5.2.3. Governance Structure

Dutch pension funds are legally independent companies run by boards of trustees with equal participation of employers and employees. The governance structure at Dutch pension funds does not discourage trustees from taking the degree of investment risk that they deem appropriate in the interest of active and passive plan members and the plan sponsor. Required by law, there are now clear agreements in place how to share risk and return, how to use higher than expected investment returns to either improve the benefits for the members or reduce the funding cost for the sponsor, and the other way round, how to distribute the burden in case of lower than expected investment returns. A ‘policy ladder’ may state that pensions are fully indexed when the fund fulfils the solvency requirements at a level of around 130%, that pensions are only partly indexed when the solvency level falls to below 130% and that indexing stops at 105%, which is the minimum level. Below 105% a recovery plan is legally required which usually includes an agreement with the sponsor to increase contributions, and above a funding level of e.g. 150% the sponsor might benefit from a reduction in premiums or even benefit from the restitution of the surplus, which is not legally prevented in the Netherlands.

5.2.4. Pension Plan Design

Pension plans in the Netherlands are still overwhelmingly DB, but most plans changed from the traditional final salary plan to average salary plans. Final salary plans provide automatic wage-indexing, which is usually close to inflation-indexing, of pension accruals as pension entitlements are linked to the number of years in service and the ‘final’ salary. In an average salary plan, pension accruals are linked to the annual salary earned in each year of service. Inflation-indexing of pension accruals is an explicit goal of pension funds’ policy, but conditional to the financial position of the fund. This relates to the sharing of investment risk between employer and employee. Average salary plans therefore combine elements of DB and DC plans, which leads Ponds and van Riel to conclude that ‘average-wage pension plans may be better viewed as hybrid DB-DC schemes’ (Ponds 2007).

The change to average-salary plans provided Dutch pension plans with a second policy instrument besides the contribution rate. It can be seen as a real option, enhancing flexibility. This flexibility allows pension funds to better cope with external shocks. As one market participant put it: ‘Flexibility keeps the system alive’. Conditional indexing thus becomes a powerful policy instrument. Ponds and van Riel showed in the context of an ALM study that with the change from final-salary to average-salary plans a pension fund gains nearly complete protection against shortfall risk (Ponds 2007).

The new trend in the Netherlands is the change to ‘Collective Defined Contribution (CDC) Plans’¹⁰. In a move which is according to market participants mostly driven by the introduction of the IFRS accounting rules, pension plans are further changed to hybrid plans, which offer DB like guarantees to the employee but qualify as DC plan in accounting terms for the employer. Under a CDC plan, the premium is fixed over a time horizon of 5 to 10 years at a level above the level needed under a DB plan thus including a risk buffer. The employer can no longer be made liable for shortfalls, but is not able to recover surpluses either. Basically, the employer opted out of the risk sharing mechanism of a DB pension fund. The pension fund renounces ‘the use of the contribution rate as a risk-steering instrument’(Ponds 2007). Under a CDC arrangement the intergenerational risk sharing between active and passive members is at the core of the system.

5.2.5.Regulation

Dutch regulation is traditionally funding orientated. In the absence of a pension insurance fund, the safety of the pension fund system is based on the solvency of the pension funds. At the beginning of 2007, the Dutch Central Bank (DNB)¹¹ which is the prudential regulator for the financial situation of the pension funds, imposed an entirely new regulatory system, which is a risk-based approach based on the fair value principle, which applies to both pension funds and insurance companies, albeit with some differences.

Of the here analysed countries, Dutch regulation is the first and up to now only one to fully apply the fair value principle in regulating pension funds. Pension funds assets and liabilities are valued in an equal way, thus exposing both sides of the balance sheet to capital market risk. Only the contribution rate can still be calculated based on a fixed discount rate of 4% to counter undesirable volatility of the contribution rate.

The new regulatory approach was under discussion for a long time. The basic principles of the Financial Assessment Framework (FTK) were already outlined in 2001 by the Pensioen- & Verzekeringkamer, the predecessor of the DNB. ‘On the basis of generous external feedback and progressive internal insight, work continued on the substance and the practical implementation of the FTK with, of course, strong input from the international dimension (IASB-IFRS, the Solvency II project and the Basel II Capital Accord for banks)’¹. The new FTK was finally implemented as of January 2007, with a delay of one year, and after some relaxations, i.e. lengthening of the required recovery periods.

¹ http://www.dnb.nl/dnb/home/supervision/supervision_of_pension_funds/ftk_consultation/en/47-150605-64.html

The pension liability relevant for regulation-purposes is the pension liability derived from the accrued nominal benefits discounted with the term structure of zero-coupon interest rates, thereby excluding conditionally indexed benefits. Dutch pension funds pay indexing out of their current investment returns, only unconditionally indexed benefits must be backed by funded assets. This regulation is the main reason that pension funds have nearly all clarified that indexing of pension benefits is conditional. The difference between the regulatory relevant ‘nominal’ funding ratio and the funding ratio ‘in real terms’ refers to the conditionally indexed pension benefits, which can amount to approximately 50% of the pension funds’ balance sheet.

At the heart of the Dutch pension regulation are the solvency requirements. Pension funds have to fully fund their nominal liabilities with a solvency buffer of 5%. The probability of undershooting 100% may not be larger than 2.5%, which has to be proven in a solvency test. According to model calculations by the regulator, this will require the average pension fund to be funded at approximately 130% of their nominal liabilities (Pensioen-verzekeringkamer 2004). Pension funds are given a recovery period of three years to restore financial stability if the funding ratio fund falls below a funding ratio of 105%. Pension funds are requested to prepare a recovery plan with a planned recovery period of up to 15 years, which must get approved by the regulator, when the funding level is between the targeted solvency balance (130% for the average fund) and the minimum funding level of 105%. Pension funds also have to pass a continuity test every three years, where they have to prove in the framework of an ALM study their long-term financial stability over a period of 15 years, including the outlining and financing of their indexation objectives.

There are three ways to perform the solvency test, which vary according to complexity and sophistication. Small pension funds with a low risk profile of their investment portfolio can apply the ‘simplified method’ thus exempting from any complicated calculations. The solvency test provided by the Dutch Central Bank under the ‘standard method’ will be applied by most pension funds, which is a scenario technique to calculate their funding requirements based on the composition of their portfolios. Based on historic data this test provides pension funds with scenarios for market and credit risk they have to fulfil with 97.5% probability measured on a one year horizon. The implementation of internal models comparable to those introduced to the banking industry within Basle II constitutes the most sophisticated way in terms of risk management to perform the solvency test. Unfortunately, the parameters were chosen in a way that internal models will not be rewarded and therefore are unlikely to get implemented. In this respect, the Dutch regulation falls one step short of implementing a really sophisticated, risk-based regulation.

Investment regulations will not be affected by the new pension legislation. Current regulations are based on the Prudent Person Rule. There are no quantitative investment rules apart from a 5% ceiling on investment in the sponsoring employer (10% in the case of employer groups).

5.2.6. Investment Strategies

Overall, the asset allocation of Dutch pension funds remained remarkably stable since the early 2000s. The equity exposure fluctuated only slightly between 35% and 41%. The only obvious changes were an unspectacular increase in the bond quota from 35% in 2000 to 40% in 2005 and a corresponding decline in the percentage of assets invested in private loans from 6.5% in 2000 to slightly above 1% in 2005. A recent study on the financial behaviour of Dutch pension funds from 2002 onwards confirms that ‘pension funds do not reduce the risk of their portfolio after a deterioration of their financial position’ (Kakes 2006). Rebalancing behaviour, i.e. restoring a strategic asset allocation by net purchases or sales to balance price movements, was found especially for the large industry-wide pension funds, whereas company-pension funds, on the other hand, are faster at adjusting contributions (Kakes 2006). These findings are in line with what would be expected built on intuition, as companies are more committed to their own pension funds where they are the only sponsor than in case of an industry-wide pension fund, where they are just one under many, and are hardly able to influence the decision-making process. The difficulty to organise the consent to increase contributions rises with the number of parties involved.

With two-thirds of their assets invested abroad, there is no home bias of Dutch pension funds. Differences in the asset mix were found to be attributable mostly to size: ‘Large pension funds hold more foreign assets than small ones’. But company pension funds, which are usually smaller than the industry-wide ones, ‘are more internationally orientated’ (Kakes 2006). This internationalisation of the pension funds’ asset allocation took place during the 1990ies, when Dutch pension funds diversified out of private loans, mostly to the Dutch Government, into equities, real estate and bonds (van Riel 2003).

Graph 1: Asset Allocation of Dutch Pension Funds 2005

Drawing on a survey by JPMorgan Asset Management (Franceries 2006), LDI strategies seem to be very popular in the Netherlands, with a total of 66% of respondents either already using an LDI strategy or implementing or considering implementing an LDI strategy. But the understanding of LDI in the Netherlands seems to differ distinctively from the predominating view in the UK: Instead of a risk-

immunising strategy, the Dutch view focuses more on using the liabilities as the benchmark for the management of assets, a view which is more consistent with the actual asset allocations. In 2006 market participants observed, that not many Dutch pension funds have actually hedged out interest rate and inflation risk, although regulation ought to drive them into these strategies. This seems to have changed with the actual implementation of the new legislation. Early simulations from the research department of the DNB expected the FTK ‘ to only slightly reduce the attractiveness of equity investment’ but the ‘ the optimal duration of bonds in portfolio seems to be much higher than currently observed’ (Vlaar 2005). According to market participants, reducing the interest-rate mismatch between the duration of the pension assets and the usually much longer duration of the pension liabilities has become widespread. This is backed by recent research from the DNB, which found that already ‘in recent years, many pension funds have extended the average maturity of their fixed-income portfolios (DNB 2007). A further technique to reduce the duration mismatch especially in the context of a Dutch pension funds seeking full inflation-indexing is shifting parts of the portfolio into inflation-linked bonds. Inflation-rate swaps are increasingly applied to fully hedge the interest-rate mismatch, especially as the swap market is much more liquid than the market for inflation-linked bonds and also Dutch pension funds are experienced derivative investors.

Overall, Dutch pension funds have become more funding orientated, ‘the investment policy is turned to the goal of maintaining a certain solvency level in the fund.’ The new regulatory framework, which seems to be based on broad consent in the Dutch community, was cited as the main reason for this change in the investment strategies, followed by the new accounting rules IAS 19.

Asset Management is often conducted in-house. Especially the large industry-wide pension funds employ highly professional teams and can be regarded to be at the cutting edge of investment and risk management know how. These investors increasingly capitalise on risk premiums apart from equity, which can be found in alternatives, thereby either reducing or better diversifying risk. An increasing number of pension funds outsource the investment process under a ‘fiduciary management’ arrangement, which is basically is a partnership between the pension fund and the fiduciary manager, who is the agent acting on behalf of the pension fund. The pension fund board concentrates on strategic issues and supervises the fiduciary manager. The fiduciary manager advises the board and takes over all operational issues, ranging from proposing the strategic investment policy, constructing the investment portfolio, manager selection up to reporting and risk management. The fiduciary manager usually refrains from managing client’s assets themselves thus reducing conflict of interest. This concept requires carefully monitoring the inherent principal agent problems.

5.2.7. Risk Management

The main risk management tool is Asset-Liability-Management, which can be regarded as being firmly in place in the Dutch market, although the Kakes' study states that ALM becomes (even) more important following the fact that it is now legally required (Kakes 2006). The large industry-wide pension funds and the large pension fund management companies conduct the ALM themselves, but mostly ALM-studies are carried out by consultants¹². ALM is mostly used as a tool to decide on the optimal pension policy in the framework of the 'pension deal' and to derive the strategic asset allocation.

The implementation of the fair value principle, which makes both pension funds' assets and liabilities volatile, poses a challenge for risk-managing. The leading Dutch pension funds developed their ALM tools into what is called 'value-based ALM'. 'As future outcomes are discounted back to the present with an appropriate risk adjusted discount rate' the present value of the key variables is added to the information given in the ALM. Also, risk preferences which are commonly an exogenous variable in ALM models become endogenous under 'value-based ALM' (Kortleve 2006). As was shown by Kortleve and Ponds, the application of value-based ALM often leads to a different mostly lower risk profile of the pension fund (Kortleve 2006).

ALM represents in the Netherlands the strategic tool for deriving the pension deal and to manage risk on the strategic level. Risk budgeting is a more operational tool which is further supplemented by risk monitoring. Dutch pension funds are reported to *'map the whole investment process from the SAA to the TAA, the sector allocation, timing, yield curve position etc. and to allocate risk budgets to each step in the investment process. They apply tracking error limits and basically calculate the performance contribution and the tracking error of each step of the investment process. This is a relative VaR approach compared to the benchmark'*.

5.3. United Kingdom

5.3.1. Context

The UK pension fund market is the largest in the European Union with EUR 1.2tr assets under management in 2005 (OECD). Although the market is highly segmented with an estimated 12,000 pension funds providing DB pensions to employees in the private sector, thereof around 5,000 with less than 12 members, over 60% of active employee members are concentrated in the very large pension funds with

more than 10,000 members. The single company pension fund is the dominating organisational form in the United Kingdom. The number of multi-employer funds is estimated at 400. DB pension funds have been rapidly closed by their sponsors, leaving only about half of the DB pension funds still open for new members, although funds are mostly left open for new accruals of existing members. This trend further aggravates the maturing of fund population, which was already induced by the general demographic trends and by company-specific demographics, i.e. the downsizing of UK based workforce due to economic restructuring at large UK companies, and which became one of the main determinants for risk management. The increasing maturity of UK pension funds poses the economic rationale for the closer focus on the funding level and the subsequent de-risking of the investment portfolios, as the statistical probability of counterbalancing shortfalls in the funding level triggered usually by losses on the equity investment increases with the time horizon, loosely drawing on the adage ‘uncertainty increases with the square root of time’ (Hull 2007). This applies especially for cash-flow negative pension funds, i.e. pension funds which face higher outflows of money for pension benefits than inflows in form of contributions and investment returns.

5.3.2. Funding Status

The funding status of UK pension funds seems to have improved significantly. Research by large pension consultants and actuaries published in the Financial Times¹³ suggest a recurrence of surpluses which would imply the resurrection from the underfunded situation in 2003/2004, when the aggregate shortfalls were estimated in a range from GBP 55bn to 65bn, representing 6.5 percent of GDP (OECD, 2005a), ‘raising concern amongst policymakers’ (OECD, 2005a).

However, the funding status at UK pension funds is difficult to assess. The new regulating authority, The Pensions Regulator, demands to calculate technical provisions with an accrued benefit funding method, but does not prescribe the exact methodology of valuation nor guidelines further actuarial assumptions, which is the task of trustees and the fund’s actuary to decide on. The pension funds’ valuations are not compatible as each fund applies its own ‘best actuarial’ estimate. In practice, the ‘actuarial valuation’ does not seem to have changed compared to the practice before the ‘perfect pension storm’ thus ignoring the changes in the accounting methodology which applies to the plan sponsor. Liabilities are still discounted with the expected return on assets, only the return assumptions have usually been lowered, which could be informed as much by the current market situation as by the experiences of the ‘perfect pension storm’.

The accounting bodies on the other hand demand the plan sponsor to calculate a prospective benefit obligation, which includes mainly future salary increases, and to discount it with the yield of corporate

bonds. A pension fund which is fully funded under its own actuarial valuation can therefore still pose a significant deficit for the plan sponsor. On the other hand, a pension fund with a FRS17/IAS19 surplus can be expected not to be on The Pensions Regulator's radar. The third usually reported funding ratio is the funding level calculated according to the rules of the Pension Protection Fund (PPF), which is calculated on the basis of a termination liability. The 'buy-out' ratio, which represents the hypothetical value an insurance company would place on the pension fund in the hypothetical case of a buy-out – 'hypothetical' because the 'buy-out'-market lacks the liquidity for taking over pension funds of a significant size -, forms funding ratio number four.

The current situation in the United Kingdom demonstrates the difficulty of constructing 'funding'. All funding ratios have their own rationale. Still, funding gaps are ambiguous as, firstly, their extent depends on the highly disputable choice of the valuation methodology and, secondly, they do not take into account the sponsor's covenant, which underwrites the pension promise in the Anglo-American pension system.

5.3.3. Governance Structure

Occupational pension funds in the United Kingdom are usually set up as pension trust funds which are legal structures connecting the assets provided by the plan sponsor for funding the pension promise, with the trustees holding these assets for the benefit of the individual members (Blake 2003). The relationship between the three involved parties and their agents, i.e. actuary, consultant, investment bank, informs the governance structure at UK pension funds. Unlike their counterparts in continental Europe, UK pension funds have mostly very small staff, therefore relying heavily on outside advice and operational support. Trustees are bound by fiduciary law to act in the sole interest of the beneficiaries. The 'general power of investment' (HMSO 2000) rests with the trustees. This power is surprisingly unrestricted, only bound by the 'duty of care' and the obligation 'to obtain and consider proper advice'. This regulation paved the way for the strong influence of the pension consultants in the United Kingdom. UK pension funds overwhelmingly use external investment managers, internal asset management is confined to some of the very large funds. UK pension funds rely heavily on consultants in determining the investment strategy. The attitude towards consultants could be described as heterogeneous, ranging from denoting them as 'the angels of the trustees' up to describing the UK as being in the 'stranglehold of the large consultants'. The 'reliance by trustees on a small number of investment consultants supplying actuarial and investment advice bundled together' was addressed by the Myners' report as one of the problems in the UK pension market resulting from the trustees' lack of the necessary investment expertise (Myners 2001). Although in the United Kingdom, as in all Anglo-American systems, the trustees are firmly at the heart of the pension fund system, UK law does not require trustees to have professional know-how, only that they 'obtain

proper advice' about it. What is legally termed 'the duty of care' and generally referred to as 'Prudent Person Rule' requires trustees to act with 'reasonable care and skill'. Shortcomings in the competence of trustees and consultants were first addressed in the 'Myners' Report', subsequently academically researched, see e.g. Clark, and finally politically addressed.

Role and duty of the trustees and their relation to the plan sponsor was last clarified by the Pensions Act 2004 and further detailed by the 'Codes of Practice' issued by The Pensions Regulator, the regulatory authority which was established following the 2004 Pensions Act in succession to the Occupational Pensions Regulatory Authority (OPRA). A detailed process was established as to the responsibilities of the trustees regarding the funding of the pension fund, the instances in which the agreement of the employer needs to be reached or where the employer is merely consulted and how to act in case of dissent. In general, this opened a gap between the sponsor and the board of trustees. In terms of risk management, the sponsor of a well funded pension fund is usually inclined towards a more return-orientated approach towards risk taking, as the higher returns reduce the cost of the plan. On the other hand, the new accounting rules FRS17 and IAS19 respectively have eroded the risk-taking capacity of the employer (Boeri 2006) and triggered the closure of pension funds (Klumpes 2003). The trustees who are responsible for the investment decisions have in many cases become significantly risk averse as they are not rewarded for risk-taking. The variables determining the risk appetite of trustees can be summarised as follows and are further outlined in a highly stylized way:

- status of the plan with regards to ongoing / closed,
- funding level,
- covenant of the sponsor.

In a fully funded ongoing plan trustees might be happy to take more risk, if the excess return is also used to improve the benefits of the members. In a closed scheme, trustees become more risk averse as excess returns would benefit only the plan sponsor in form of contribution holidays. In case of underfunding, quite often the sponsor would like the trustees to take more risk in order to be able to close the funding gap with investment returns thus avoiding higher contributions. As the underfunding is a concern for the trustees as well, they might be expected to be willing entering negotiations of more risk taking, provided they trust the covenant of the sponsor. Risk-immunising LDI strategies are in the UK often driven by the trustees. The implementation of LDI was held back by the underfunding situation and – until spring 2007 – by the low level of yields, which rendered the cost of LDI strategies too high compared to the benefit. Some market participants expected LDI to gather pace significantly once the funding gaps are closed and bond yields

have ‘regressed to the mean’. The interests of trustees – safeguarding the pension benefits of the members – and sponsors – eliminating balance sheet risk – could be closer aligned and the costs of immunising would be lower.

5.3.4. Pension Plan Design

The majority of pension plans in the United Kingdom are final salary plans, where the pension at normal retirement age is related to pensionable earnings at the time of leaving service or shortly before. The typical rate of accrual at private sector funds is 1/60th of annual salary. Investment and longevity risk are usually borne by the employer only. Therefore, one can argue that the solvency of the sponsor underwrites the pension promise. Unlike e.g. the Netherlands, changes to plan design to re-distribute risk between the stakeholders have not been negotiated. In the United Kingdom, pension deals at companies’ pension funds may include burden sharing in the sense that early retirement options are less onerous or that employees’ contributions are being increased in exchange for the willingness of the plan sponsor to keep the pension plan open for new accruals, but investment and longevity risk usually stays with the company.

Since 1997, pensions in payment must be indexed. The Pensions Act 1995 turned the prevailing market practice into a legal requirement (CHECK). Pensions which accrued after April 1997 must be indexed with the retail price index (RPI) up to a maximum of 5% p.a. For pensions accruing from 2005 onwards this cap was reduced to a maximum of 2.5% p.a. This indexing requirement renders inflation hedging an important investment goal at British pension funds and distinctly increased the cost of providing DB pension benefits. As one plan sponsor remarked: ‘Indexation of benefits is the biggest threat to DB plans’. According to market participants, most employers have therefore stopped granting not-legally required annual cost of living adjustment in the wake of what is commonly termed the ‘pension fund crisis’ of the early 2000’s, exploiting the fact, that inflation adjustment is not included in the trust deed but at the employer’s discretion.

5.3.5. Regulation

The United Kingdom implemented new pension legislation in 2004. The salient elements are the establishment of a pension insurance fund, the Pension Protection Fund (PPF), for protecting pension benefits in case of insolvency of the plan sponsor and the establishment of a new regulatory authority, The Pensions Regulator, which supervises the implementation of the risk-based and funding-orientated approach, thus also ‘protecting’ the PPF.

Only with the 1995 Pensions Act did funding become a relevant policy issue. The Minimum Funding Rule (MFR) obliged employers to fully fund their liabilities according to specified definitions. Funding gaps were turned into legally enforceable debt of the employer. As Blake (Blake 2003) points out, prior to the act, employers could decide to wind up their pension funds and reduce the benefits according to the availability of funds. Although a binding policy requirement for only a short time, the MFR was strongly criticised from the beginning, among others, as being too strict, not taking into account scheme-specific factors, and because ‘the MFR has encouraged pension fund managers to lower their weighting in equities and other ‘volatile’ assets’ (Blake 2003)¹⁴.

The criticism of the MFR was taken into account in formulating the 2004 Pensions Act, which states that:

‘every scheme is subject to a requirement (‘the statutory funding objective’) that it must have sufficient and appropriate assets to cover its technical provisions’,

but does not prescribe details of e.g. the applicable valuation methodology or time horizon over which a pension fund is expected to be fully funded. In this sense, the regulatory approach in the United Kingdom is ‘scheme-specific’ and ‘principle-based’: It gives general guidance but leaves the detailing in the responsibility of the pension funds. This approach also caused concern at first, as it gave little orientation. With the release of the ‘trigger-points’ for regulatory action the situation became clearer. Pension funds are required to formulate a ‘Statement of Funding’. None of the interviewed pension funds followed an explicit funding target.

In general, pension funds commented that regulation does not impact their investment strategy. The regulatory changes that were cited to have the most impact are the changes to the governance structure (see *Governance*). Apart from the indirect influence on the risk attitude via the governance structures, UK regulation could be classified as being well-balanced on risk. The Pensions Regulator’s Code of Practice on Funding Defined Benefits states explicitly that *‘Whilst technical provisions should represent a prudent reserve to hold against a scheme’s future liabilities, trustees are not obliged to attempt to eliminate all risk that they will fail to be sufficient.’*

5.3.6. Investment Strategies

The most noticeable investment trend in the United Kingdom is the reduction in the share of assets invested in equity and the development of ‘Liability-Driven-Investment (LDI) Strategies’, which are indications of a changing risk attitude of UK pension funds.

Traditionally, UK pension funds had the highest equity exposure of all OECD countries¹⁵, which is usually quoted at around 70%. The classical balanced mandate, with 70% of assets invested in equity and 30% invested in bonds (Blake 2003) constituted the dominating investment practice. This underlines the statement of a market participant: 'Pension funds in the UK have lived of beta, of rising equity markets'. According to the traditional pension investment paradigm, shares constitute the best hedge against inflation. As UK pension funds are legally obliged to index pension benefits, hedging inflation constitutes a major investment goal. This rather crude investment policy was not discouraged by either context or regulation.

Market risk, namely volatility of equity markets, seems not to have constituted a relevant risk category for pension funds. Pension funds were less mature with a smaller percentage than today being cash negative. The traditional actuarial valuations, which were conducted every three years, mostly ignored market risk by applying extended smoothing.

UK pension funds reduced their equity exposure to around 60% in 2005 in favour of bonds¹⁶. Investment in alternative asset classes is still low, with private equity and hedge funds accounting for 1% and 0.6% of assets in the mean respectively. The National Association of Pension Funds (NAPF) suggests that investment in alternative asset classes is confined to a small number of large pension funds. But nearly half of the DB funds questioned in the NAPF survey use derivatives for their investment strategy, mostly currency forwards and index futures. Stock lending is permitted by 23% of funds, mostly by large private or public sector funds. Pension funds have moved away from balanced mandates, employing specialist managers instead. The core-satellite-approach is nowadays market practice.

LDI strategies were invented for UK pension funds in 2000 and have been intensively discussed ever since. Predicted to become the dominating investment strategy within short, the percentage of institutional assets invested in LDI products is estimated at 5.3%. The basic idea of LDI is to immunise the pension fund against interest-rate risk, which can be defined in the context of a DB pension fund as the shortfall risk resulting from an increase in the liabilities in a fair-value perception triggered by the volatility of applied interest-rates. LDI strategies can be implemented by either investing the portfolio in long-dating bonds or by hedging out the interest-rate risk via derivative constructions mostly by implementing interest-rate swaps. In this stringent form, LDI strategies are risk-averse investment strategies complementary reducing expected return and thus increasing pension costs for plan sponsors, which weighted especially heavily during the period of low interest-rates from up to 2006. Other versions of LDI aim at hedging the interest-rate risk for the liability cash flows e.g. ten years into the future by buying the appropriate portion of assets into LDI products and investing the remaining portfolio into what is termed 'return-seeking assets', which constitute of equity and to a comparatively large extent on alternative investment classes. In such

constructions, LDI portfolios do not necessarily reduce the total risk of the portfolio, but redistribute the sources of risk. Whereas in the traditional balanced mandate, risk measured by volatility or VaR resulted mainly from the equity portfolio, in a LDI portfolio it is more evenly spread over the asset classes.

This noticeable de-risking of UK pension funds is driven by a combination of several factors: First, UK pension funds have matured with a considerable percentage being cash-negative. Second, the introduction of the new accounting standard FRS 17 impacted the risk-taking capacity of the sponsoring employer. Third, trustees have become more risk-averse following the clarifications of the governance structures of the 2004 Pensions Act. Otherwise, regulation was mostly classified as neutral to the investment strategy by the interviewed market participants. Some authors tried to link the shift towards bonds to the new accounting rule FRS 17: As employers try to shield balance sheet against capital market volatility, they implement bond-driven investment strategies in the pension fund's portfolio to immunise the pension fund against fluctuations of bond yields. Although this link seems to be obvious on the surface as FRS 17 has clearly eroded the risk-taking capacity of the employer, this view disregards the specific governance structures at UK pension funds: The trustees decide on the investment policy in the interest of the plan members. The trustees might follow suggestions of the employer in implementing an immunising LDI strategy, if it aligns with the interests of plan members. But to assume that trustees simply implement the plan sponsors' wishes equals assuming that the trustees are in constant breach of their fiduciary duty. In practice, there are cases where the trustees implemented a LDI strategy against the wish of the sponsor, because they found the risk of the sponsor's covenant too high thus imposing the higher contributions that go with LDI on the plan sponsor.

5.3.7. Risk Management

According to market participants, ALM is standard in the market and has been for quite some time, although the link between assets and liabilities has tightened: 'In the 1980s and 1990s, the asset allocation was done in the light of the liabilities, we are getting a much greater and more direct input from the liabilities now.' The reasons can be attributed to the increasing maturity of the funds and a more funding focussed attitude of all stakeholders: 'There are fewer degrees of freedom available now'.

ALM studies are usually conducted every three years along with the actuarial valuation. Since Myners' criticism of the bundled provision of actuarial and investment advice, advice is more often split between the few large pension consultants in the UK, who also provide risk modelling, calculating and budgeting analysis. VaR calculation are being conducted, scenarios generated, fat tails analysed. At some pension funds 'asset-liability-modelling has become an ongoing process'.

According to the NAPF survey, nearly 90% of schemes (asset-weighted) base their investment decisions at least in part on an asset-liability study. 'Large employers are more likely to use asset-liability studies' (NAPF). Asset-liability studies are in the UK conducted by consultants. Nearly 80% of funds base their SAA decision on the advice of an external consultant.

But the general reservations in the United Kingdom towards asset-liability modelling which were also formulated in the Myners report still persist. The Pensions Regulator Code of Practice on Funding Defined Benefits reiterates Myners' criticism that the results of the ALM depend decisively on the assumptions made and explicitly warns trustees that ALM may not be mistaken as a forecasting tool 'rather they are illustrative of possible outcomes' and should not 'take on a credibility in the eyes of trustees and others which is unwarranted' (ThePensionsRegulator 2005).

But also some interviewees expressed concern against the currently available quantitative risk management tools, which they say apply risk definitions and risk management approaches that are not suitable for the needs of pension funds. This criticism refers to the treatment of market risk and the definition of the investment horizon. Especially industry-wide pension funds who are not concerned with the sponsor's covenant tend to ignore the risk management systems derived from the bank's trading departments conceptualising themselves as the classical long-term investor: 'We don't pay any attention to something like Value-at-Risk', further stating: 'We are a friend of volatility'. But also users of sophisticated risk management systems like the tools marketed by Barrie&Hibbert mostly at insurance companies express concern about becoming too short-termed: 'Risk budgeting with a VaR on the basis of one year is probably not a great thing for a pension fund'. But as there is no legal necessity to manage the fund along these lines, UK pension funds tend to use these systems more as an information tool and not as a stringent management tool.

5.4. United States

5.4.1. Context

With pension assets under management close to EUR 10 trillion in 2005 representing nearly 100% of GDP, the US pension market is the largest pension market worldwide in absolute terms and number four in relation to the economic size (OECD). In the private industry, total assets of private pension plans reached USD 5.5 billion at end 2006 (FederalReserveBoard 2007). About 50% of workers in the private industry participate in a retirement plan. The market is highly segmented. Albeit steadily shrinking, the number of retirement plans was still 683,000 at end 2004, thereof 48,000 DB and 636,000 DC plans with the vast

majority of the latter being very small plans with less than 100 participants (DOL 2007). Single-employer plans are the dominating organisational form in the United States.

The long-term decline of DB pension plans in favour of DC plans is extensively academically researched (see e.g. (Munnell 2006), (Clark 2006)) and shall be only documented in a nutshell here. The importance of DB pension funds in the United States in terms of both number of plans and number of active participants peaked in the mid-1980ies at 175,000 plans in 1983 and 30 million active participants in 1984 respectively. But the move from DB to DC had actually already started in the mid-1970ies when the number of newly created DC plans started to outnumber newly created DB plans. 1984 marked the first year when the active participants in DC plans outnumbered those in DB plans. But the high growth of DC plans failed to halt the general decline in the number of retirement plans (Ghilarducci 2006), which fell further to 683,000 plans in 2004. The Private Pension Plan Bulletin, which is a regular survey of US pension funds based on companies' annual reports by the U.S. Department of Labor, documented for 2004 the first slight increase in the number of DB pension plans by 1%, albeit the number of workers participating in such plans continued to decline (DOL 2007) to just 20 million, compared to nearly 44 million participating in DC pension plans. This is statistically insignificant and cannot be interpreted as the beginning of a reverting trend. In terms of assets under management the market share of DB pension funds decreased to 45%, which means that for the first time, DC pension funds surpassed DB funds in absolute terms. The US DB pension fund system is very mature with 49 pensioners per active members, which reflects its long-term decline.

As in the United Kingdom, employers started in the early 2000s to close down DB pension funds. But whereas the UK employers usually keep the plan open to accruals for new employees (what is termed 'soft freeze' in the US), in the US it is also widespread to close funds to all accruals ('hard freeze').

5.4.2. Funding Status

The perception of the funding status of US pension funds remains mixed. Whereas data from the industry document the continuing further improvement in funding levels of the 100 leading pension funds, which succeeded to return to almost fully funding in 2006 (Milliman 2007), the Pension Benefit Guaranty Corporation (PBGC) remained doomed in its latest annual report, stating that 'the system has never been under greater stress' (PBGC 2006). This difference in the construction and interpretation of data is only partly due to the difference in the publishing date of these two documents. Rather, 'funding' can be viewed as being politically constructed in the United States, thereby offering differing and sometimes conflicting views on the 'funding status' of pension funds, which bears similarities to the UK experience. The industry

data report an aggregated pension deficit measured against the projected benefit obligation of ‘a mere USD 4.3bn’ for the 100 large corporations that sponsor defined benefit pension plans, which turns into an aggregated surplus of USD 73.9bn when measured against the accumulated benefit obligation (Milliman 2007). PBGC, on the other hand, which is the federal agency that insures private pension claims, forecasts its own deficit measured as the difference between its premium income and its expenditures for covering vested pension claims of beneficiaries whose companies went bankrupt. For this purpose, the PBGC calculates the termination liability and includes not only actual but also expected bankruptcies. Although PBGC’s forecasts of upcoming pension claims proved to be reliable, the nature of the applied methodology is embedded in insecurity, thereby giving scope for interpretation. PBGC’s general conclusion on the state of the system cited was published in summer 2006 (August 18), the day after President Bush signed the Pension Protection Act. On November 15, the PBGC released the financial results for fiscal year 2006, showing that its deficit actually improved from USD 23.1 in fiscal 2005 to USD 18.8bn in 2006, which was due to political relief for the airlines provided by the PPA 2006. The PBGC commented this development: *‘The PBGC’s financial condition appears to have stabilized for the time being. Our current assets can cover pension payments coming due for a number of years into the future, and our exposure to additional losses has declined.’*²

Thus, following the interpretive turn as outlined by Clark (Clark 1992), the annual report issued by the PBGC can be seen as a political document aiming at controlling the interpretation and thus influencing political decision-making.

5.4.3. Governance Structure

‘A dominant feature of the investment policy of a defined benefit plan is that the plan sponsor bears most of the investment risk. [...] The amount of benefits payable to plan participants or their beneficiaries is not affected by investment experience, except in the event of plan termination, and only then under certain circumstances. It follows that a plan sponsor (employer or employers) can pursue riskier investment strategies without breaching its fiduciary obligations than if unsatisfactory investment results were going to diminish the benefits of the participants’. (McGill 2005)

The governance structure of Anglo-American pension funds is fundamentally regulated by the principle of fiduciary duty: Trustees and other pension fund fiduciaries (including the financial service sector) must act in the exclusive benefit of the beneficiaries (Clark 2006). As fiduciary duty forms the fundamental

² <http://www.pbgc.gov/media/news-archive/news-releases/2006/pr07-05.html>

principle of Anglo-Saxon regulatory approaches, the regulation of pension funds' governance can therefore be seen as the fundamental aspect of the Anglo-Saxon regulatory approach. With regard to managing the assets of a pension fund, fiduciaries are required to act with prudence. In the United States, this principle of prudence evolved over time into what is termed 'prudent expert principle', which means that the decision-making of a pension fund manager is compared to the investment behaviour of other professionals rather than against that of ordinary people acting with 'reasonable care and skill' as under the 'prudent person rule' which applies in the United Kingdom. In theory, the combination of the 'exclusive benefit rule' and the 'prudent expert principle' should form an ideal context for beneficiaries, as investment professionals make investment decisions on their behalf in their sole interest. The citation above already indicates that the investment reality is somewhat different.

The governance structure of US pension funds clearly incentivises risk taking on behalf of the pension fund fiduciaries. As the US law allows representatives of the management to act as fiduciaries, pension funds can actually be operated by the plan sponsor. Although pension plans have their fiduciary boards and committees, there is '*no gap between the sponsor and the pension plan*' according to interviewees. The company takes the decisions with regards to plan design, funding strategy and investment policy. On the one hand, this gives the pension fund direct access to the sponsor's expert knowledge especially in the Treasury and Human Resources Departments, which is in line with the 'prudent expert rule'. On the other hand, the goals of beneficiaries and plan sponsor might get closer aligned than they eventually are. Identity of sponsor's management and pension fund's fiduciaries bears potential conflict of interest and principal-agent problems. As was shown in section 2, the introduction of a Pension Insurance Fund, the Pension Benefit Guarantee Corporation (PBGC) in the case of the US, distorts the symmetric distribution of risks and rewards and incentivises high risk-taking.

5.4.4. Pension Plan Design

The traditional pension plan is still the dominating plan design, According to the National Compensation Survey 2005 (DOL 2007), 75% of all workers with access to a DB pension plan are covered by a traditional DB plan. Thereof, about half of the traditional DB plans are final salary plan, albeit average salary plans increased to a market share of 19%. Plans based on dollar amount formula account for 24% of all traditional DB plans. Here, the benefit is based on a dollar amount per month for each year of eligible service. The indexing of pension benefits is not legally required in the United States, although according to an interviewee '*it was somewhat market practice up to the mid-1990s*'.

Cash balance plans have steadily gained in importance reaching a market share of 23% in 2005. Cash balance plans combine features of DB and DC plans. The employer specifies a contribution and an interest rate on that contribution, thereby taking investment risk as in traditional plans. But as the resulting account balance is usually paid as a lump sum at retirement, longevity risk is shifted to the employee. The rising popularity of cash balance plans was impeded by legal insecurity in the 1990's when age-discriminating lawsuits were successfully conducted. Only a major ruling in August 2006 erased this legal uncertainty. The new regulation contains some elements which render cash balance plans now an interesting plan design for employers, even as they represent DB plans in accounting terms.

5.4.5.Regulation

The introduction of the Employee Retirement Income Security Act (ERISA) in 1974 marked the first comprehensive regulation of private pension funds in the United States¹⁷. It enacted rules to protect employee benefit rights, addressed tax issues, clarified standards for actuaries, provided pension plan benefit insurance and defined the responsible governing agencies respectively. Jurisdiction is jointly exerted by the Department of Labor and the Treasury Department. The Department of Labor is responsible mainly for protecting employee benefit rights, whereas the Treasury Department has jurisdictional authority over all tax issues and the provision of standards and qualifications for actuaries. The task of providing insurance to pension plan benefits was transferred to a newly erected agency, the Pension Benefit Guarantee Corporation (PBGC), which is a non-profit agency supervised by the Department of Labor.

But although ERISA was characterised as a 'massive and exceedingly complex piece of legislation' (McGill 2005), it marked only the beginning of intensive regulatory activity on pension funds, rendering US pension law increasingly complex. The Pension Protection Act (PPA) 2006 represents the latest piece of legislation which can be expected to exert significant influence on the way DB pension funds are managed. Signed into law by President Bush on August 17, 2006, the main changes to DB pension funds concern the funding rules which will be enacted stepwise up to 2010.

US employers used to have considerable leeway in the decision how to fund their pension plans, which led academics to conceptualise funding as a an economic decision of the employer (Fabozzi 2005). It can therefore be concluded, that funding was traditionally not at the heart of pension regulation, In a report published in May 2005, the Government Accountability Office (GAO) carefully analysed the funding and contribution behaviour of the largest DB funds and – having depicted the weaknesses of the former

funding rules - recommended '*broad pension reform that is comprehensive in scope and balanced in effect*' (GAO 2005). Criticism focussed on employers' scope for discretion in choosing the actuarial assumptions in calculation pension assets and liabilities, as well as the legal situation allowing sponsors not to make any cash contributions to their underfunded pension funds and still satisfying the minimum funding requirements. The GAO focussed on the implications for the PBGC, whose deficit had risen strongly since the turn of the millennium. Although the PBGC is not backed by a Government guarantee, there was widespread concern that a state bail-out of the pension system comparable to the Savings & Loans crisis might become politically unavoidable with considerable cost to the tax payer.

Protecting the PBGC - and finally the Government - could be seen as one motivation behind the PPA, as its two main components regarding DB pension funds, namely tougher funding rules for all private DB pension funds and the temporary relief measures for the airlines industry which was threatening to further significantly increase the PGBC's deficit, both will provide relief to the agency. Not addressed by the PPA was the non-reversibility clause, which inhibits employers from recovering surpluses, and traditionally discouraged employers from fully funding their pension funds.

A market participant summarised the new funding rules loosely as: '*The new law tries to get you to 100% in seven years, the old rule tried to get you to 90% in three to six years*'¹⁸. Furthermore, very poorly funded plans, which are less than 60% funded, are prohibited from further accruing pension benefits. This marks the first time that beneficiaries are directly affected by the funding policy pursued by their employer. The ramifications of the PPA can be expected to be most significant with regard to employers' risk management. Starting from 2007, also US regulation applies the yield of corporate bonds for the calculation of plan liabilities, thereby increasing the volatility of the pension obligation. Moreover, the, from the perspective of the plan sponsor, rather unpleasant scenario of steadily rising and not accessible pension fund surpluses is being discussed in the market. This scenario is constructed from a combination of new rules: The PPA requests plan sponsors to fully fund their pension plans measured against corporate bond yields. Plan assets usually consist mostly of assets which achieve a higher yield than corporate bonds, e.g. stocks. Once, a plan is fully funded surpluses inevitably build up. As the non-reversibility clause, which heavily penalises the recurrence of the surplus was not annihilated, these surpluses are in praxis not accessible for the plan sponsor. The first suggestions have been made to reform the taxation on excess pension assets (Pang 2007). Meanwhile, Pension consultants draw the picture of employers contributing cash annually to their newly set up DC plans while watching the cash pile up in their closed DB fund. This argument is the main rational for the new attractiveness of cash balance plans: As cash balance plans belong to DB plans, they can be set up in the same legal vehicle, thereby literally utilising the surplus of the traditional DB plan to fund the contributions for the new cash balance plans. This scenario and the

changing accounting rules have just started to heavily affect the investment behaviour of US DB pension funds.

5.4.6. Investment Strategies

To maximise returns and to protect the sponsor' are according to market participants the two dominating investing goals of pension funds. When questioned if this is always in line with the fiduciary duty of trustees, the interests of sponsor and beneficiaries were stated to be closely aligned with respect to investment.

The traditional investment strategy of US pension funds was a balanced strategy, which consisted of 60% equity and 40% fixed income, which is according to a pension consultant still widespread. But in the aftermath of the perfect pension storm, this traditional investment paradigm was increasingly criticised for not delivering the expected risk-return profile in an increasingly volatile market surrounding. Ambachtsheer consequently called for a new investment paradigm based on a set of investment beliefs, an integrative investment model and a decision-making protocol (Ambachtsheer 2005). Drawing on what is observable in the markets, pension funds geared up considerably after the turn of the millennium. The equity expose of around 60% remained mostly unchanged in nominal terms, but the domestic investment was reduced in favour of international equity, thereby partly reducing the famous 'home bias' of US institutional investors. Investment in fixed income was also reduced to below 30%. Instead, public and corporate pension funds shifted assets to alternative investments, especially private equity and equity real estate, thereby following the investment behaviour of the large endowments. Taken into account the parallel surfacing of partly large deficits this investment behaviour could be conceptualised as 'gambling against resurrection'. Neither external regulation nor internal governance rules prevented pension funds from increasing the investment risk when facing funding deficits. As US accounting rules allowed for discounting liabilities with the expected rate of return, this policy helped to reduce deficits by increasing the portfolio of riskier assets promising higher returns. The gamble paid off nicely, as pension funds recovered by benefiting from strong returns on equity and alternatives between 2003 and 2006. Taken into account the put option provided by the PBGC, the actual risk taken by sponsors was limited. The investment behaviour between 2003 and 2006 can therefore serve as an example for the asymmetric nature of the governance rules regarding risk taking, which prevails in the United States.

2007 may mark the beginning of the next era of new 'investment paradigm'. The new Greenwich report highlights the starting implementation of new investment products and strategies.

'It is a completely new world. This is the world of absolute return, portable alpha, and liability-driven investment. All of a sudden, in a very short period of time, this big, stable, slow-moving industry may be completely shifting gears' (Greenwich 2007)

These changes in the investment behaviour can be attributed to the new accounting rules and the changing regulatory framework. LDI strategies have arrived at the doorsteps of US pension funds, with a remarkable ruling of the DOL legally paving the way. In an 'advisory opinion under ERISA' the DOL's Division of Fiduciary Interpretations stated that a fiduciary would not violate their duties *'solely because the fiduciary implements an investment strategy that takes into account the liability obligations of the plan and the risk associated with such liabilities and results in reduced volatility in the plan's funding requirement.'*

Chart 2: Asset Allocation of US Corporate DB Pension Funds

Chart 3: Asset Allocation of US Public Pension Funds

5.4.7. Risk Management

US pension plans are in general knowledgeable and sophisticated investors. Pension fund's risk management can be regarded as being integrated part of the sponsor's risk management as the pension fund is usually integrated into the financial framework of the company. The relatively high level of professionalism of US pension funds is also reflected in the fact, that especially corporate pension funds use pension (investment) consultants to a much lesser extent than their British counterparts. According to a study from Thomson Nelson³ only 38% of corporate plan sponsors use pension investment consultancy. Public pension funds, which do not have direct access to a sponsor's professional financial knowledge, use consultants much more often. 82% of public or Government funds use pension fund consultancy. The main consultant is usually the actuary, which all pension funds must have. Besides, some companies employ specialised risk managers.

ALM studies are nowadays routine in the market. With the new pension law, they are expected to become standard. But, as everywhere, availability and frequency of ALM based advice depends largely on the size

³ Thomson Nelson Annual Report of Pension Fund Consultants 2006, Thomson Nelson

of the pension fund. The very large public and, to a lesser extent, also private pension funds conduct ALM studies by themselves on a regular basis or even as an ongoing process. But mostly this is done by the actuaries or, to a lesser extent, by the pension investment consultants. Average plans with less than USD 1bn assets under management have an ALM study done by their actuary every 4-5 years.

6. Conclusions

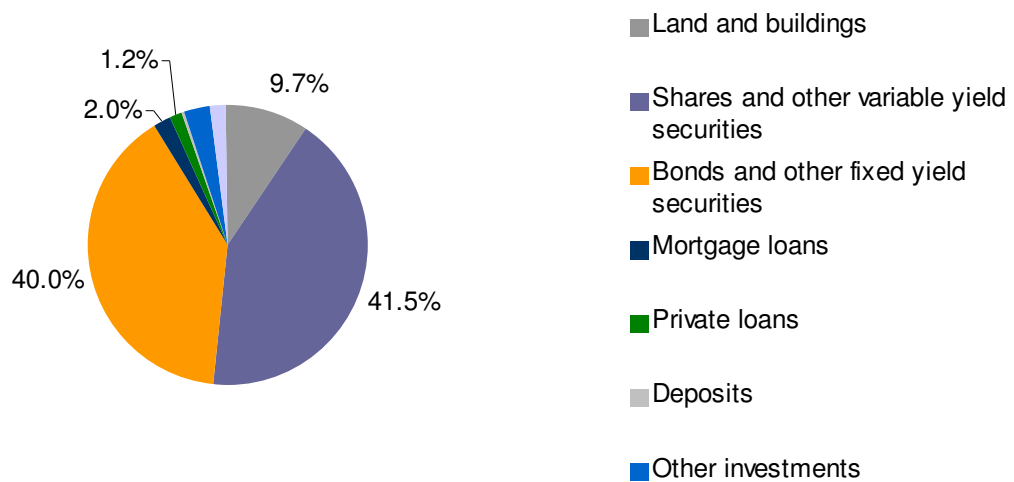
The 'perfect pension storm' enhanced the risk awareness of pension funds' management, sponsors and regulators alike. Long believed dogmas became obsolete in a short period of time. As a consequence, pension funds' risk management became more sophisticated demanding more attention and resources on behalf of pension funds. As this is driven by scale, smaller company-based pension funds have increasingly difficulties to cope with the new requirements. Fair value accounting represents a major shift in the way pension funds perceive and manage risks. But pension funds also take less investment risk than before the 'perfect pension storm'. It is questionable though, if the investment risk pension funds are exposed to really became more challenging as capital markets became more volatile or if mainly the perception of the risk-bearing capacity of pension funds changed. Fair value accounting based on modern financial economic theory can be applied as a valuable tool for professional and sophisticated risk management but it also changes fundamentally the risk-bearing capacity of stakeholders. Moreover, the new accounting rules based on fair value accounting effectively eroded the risk-taking capacity of the plan sponsor. The sustainability of the traditional single-company DB pension fund which represents the backbone of the Anglo-American pension fund system seems questionable. As an erosion of the risk-taking capacity of pension funds in general would imply longstanding macro-economic detrimental effects, new solutions are required.

Table 1: Stress-test of the German pension regulator:

Stress-test	Asset class	Market value
A 35	Equity	- 35%
R 10	Bonds	- 10%
RA 25	Equity,	- 20%
	Bonds	- - 5%
AI 28	Equity	- 20%
	Property	- -8%

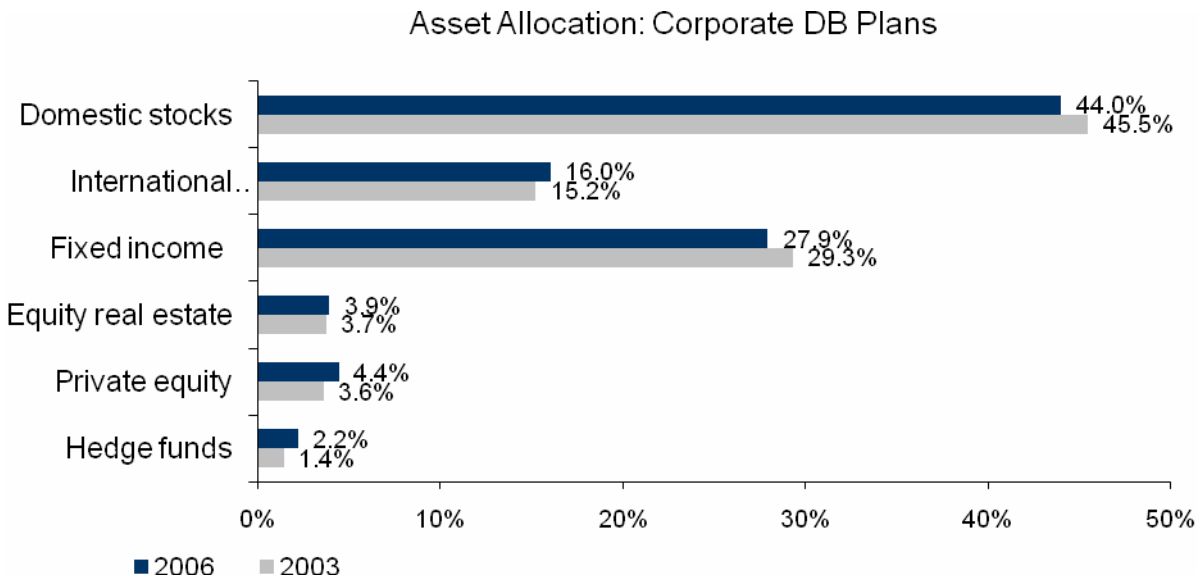
Source: Bundesanstalt für Finanzdienstleistungsaufsicht

Graph 1: Asset Allocation of Dutch Pension Funds 2005:

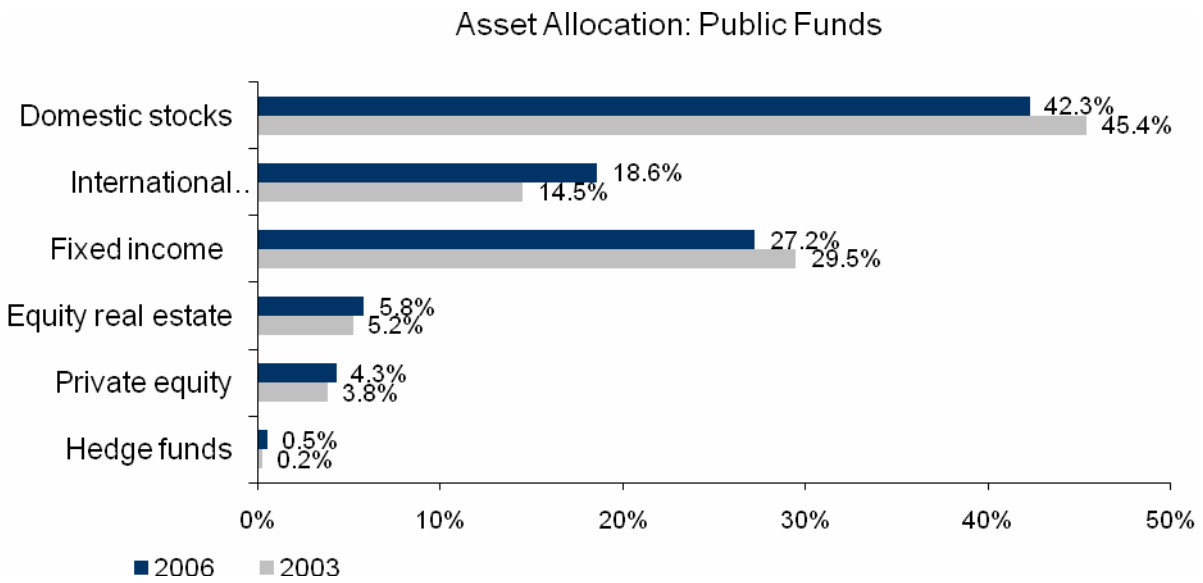


Source: De Nederlandsche Bank

Graph 2: Asset Allocation of US Corporate DB Pension Funds



Graph 3: Asset Allocation of US Public Pension Funds



Source: Greenwich Associates

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Anordnung betreffend die Darlegungspflichten gemäß § 6 Anlageverordnung [...].

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- ¹ Albeit the requested buffers are considerably smaller than those imposed on life insurance companies. The principle of 'full coverage of technical reserves' also entered into the European Pension Fund Directive for cross-border pension funds.
- ² There is ongoing debate at the EU level if the Solvency II regulations for insurance companies should also be applied to pension funds.
- ³ The abolition of quantitative investment regulation in favour of the Prudent Person Principle constitutes the only noticeable impact the economic de-regulation wave exerted on pension funds. Neither the rationale for regulation nor the regulatory instruments especially with regards to the in most countries immense legislation were critically scrutinised.
- ⁴ In the UK the mix was closer to 70:30, see (Blake 2003).
- ⁵ 'Fat tails are defined as tails of the distribution that have higher density than what is predicted under the assumption of normality' (LeBaron, 2004).
- ⁶ The youngest funding vehicle, the 'Pensionsfonds', which was introduced with the German Pension Reform in 2001, and which combines features of both vehicles as it is an insurance-like structure with mostly unregulated investment management, has just recently been chosen for funding pension liabilities by large German companies due to mostly legal problems
- ⁷ The employer is legally required to guarantee at least the accumulated contributions as pension benefit to the employee as a minimum protection against investment risks. This guarantee is also often referred to as 'zero-interest-rate-guarantee'.
- ⁸ Long-term ratings of at least BBB- by Standard & Poor's and Fitch or Baa3 by Moody's and short-term ratings of minimum or above A-3 by Standard & Poor's, F3 by Fitch, or Prime 3 by Moody's are classified as investment grade. As an exemption of this rule, 'Pensionskasse' may invest in high-yield- bonds which are rated at least 'speculative' with a rating of B- by Standard & Poor's or B3 by Moody's up to 5% of their assets.
- ⁹ The seemingly contradictory existence of both mandatory industry-wide pension funds and company pension funds is due to the regulation that a company can opt out of the industry-wide funds if it establishes a company pension fund which offers better benefits to its members than the industry-wide fund. While according to the statistics of DNB, employers and employees contributed on average 15.5% of salary to the industry-wide pension funds in 2007, the average contribution rate of 21% at company pension funds clearly exceeded this level (http://www.dnb.nl/dnb/home/file/StatisticalBullMarch07_tcm47-153821.pdf).
- ¹⁰ According to an interviewee, 15 pension funds had changed to a CDC plan design at the end of 2006 including 2 industry-wide schemes and –according to internal surveys – a total of a third of company pension funds are considering the change.

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- ¹¹ Dutch Pension funds used to be regulated by the Pensions and Insurance Supervisory Authority (Pensioen- & Verzekeringskamer), which was integrated into the De Nederland'sche Bank (DNB), the Dutch Central Bank, thus creating an integrated supervisor for banks, insurance companies, security firms and pension funds. Besides the DNB, the financial market authority is the second supervising authority responsible for protecting pension plan members.
- ¹² According to market participants, ORTEC is the dominating supplier of ALM in the Netherlands with a market share of around 80%. The internationally large consultants like WatsonWyatt, Mercer, TowerPerrins and Hewitt, cover only 20% of the market in the Netherlands. They are regarded as not sufficiently sophisticated in terms of ALM and their advisory role is mostly confined to the actuarial work.
- ¹³ According to Aon Consulting, Britain's 200 largest pension schemes 'have moved into the black for the first time in more than five years' (F.T., 18/05/2007). 'KPMG found that 15 percent of big quoted UK businesses it surveyed had schemes in surplus in 2006 using the FRS17/IAS19 accounting standard' (F.T., 27/07/2007). But according to Hewitt Associates 'last weeks' four-day rout in stock and bond markets eliminated half the accumulated surplus in pension schemes run by FTSE-100 companies that has been built up since the market trough in 2003' (F.T., 30/07/2007).
- ¹⁴ The 1995 Pensions Act introduced 'Minimum Funding Requirement' (MFR), which obliged funds to be fully funded according to specified definitions. The MFR was incrementally introduced between April 1997 and April 2002, and suspended in (CHECK).
- ¹⁵ Data on asset allocation are surprisingly hard to obtain. The NAPF does not cover asset allocation itself in its surveys but only asks for changes in the SAA. The most widely used figures are those published by large consultants based on customer surveys. Recently, also Investment Management Association (IMA) started to regularly publish data based on member surveys.
- ¹⁶ This section draws on figures published by the National Association of Pension Funds (NAPF) and the Investment Management Association (IMA)
- ¹⁷ This section draws on McGill et al 'Fundamentals of Private Pensions' (McGill 2005).
- ¹⁸ The funding rules can be summarised in more detail as follows: After a 'funding break 2006/2007, plan sponsors are requested to fund plans that are not at least 90% funded faster than under the old rules applying specified mortality tables and interest rates. Smoothing is restricted to average on the asset side. Corporate bond yields have to be applied to the valuation of liabilities. Plans that are less than 80% fund are qualified as being 'at risk' and must increase the contributions. Below 60% funding, no new accruals can be made. For more detail see e.g. Warshawsky 2007 (Warshawsky 2007)