

Implications of recent or prospective regulatory changes for financial market prices and market dynamics

**(Background note to the report on Institutional investors, global savings
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Executive Summary

- Changes in regulation, accounting and the supervisory framework have been suggested as one factor behind the low long-term interest rates because of their influence on the investment strategies of pension funds, insurance companies and other institutional investors. However, with the exception of the UK, evidence pointing to a significant impact on financial market prices has been limited thus far.
- A substantial number of institutional investors worldwide were faced with a maturity mismatch between assets and liabilities. The environment of low interest rates tends to push down funding ratios for the institutions under mark-to-market valuation.
- Purchases of long duration bonds for reasons of asset liability management (ALM), if pursued on a large scale and within a short time-frame, may exert downward pressure on long term interest rates. This could induce even more buying of long duration bonds in order to decrease the duration gap, thus exerting further downward pressure on long-term interest rates. However, again evidence of this feed-back mechanism has been confined to a few cases.
- Institutional investors may be reluctant to adopt significant changes to their strategic asset allocation for various reasons. To fulfil ALM needs insurance corporations and pension funds may take recourse to derivatives instead of increasing the allocation of long term bonds at the expense of equities. For instance, interest rate swaps are becoming more popular as a way to reduce interest rate risk by increasing the duration of assets. Insurance corporations and pension funds have also increased their exposure to risk transfer instruments in order to limit the adverse effect to income volatility on their financial statement.
- The increased trend toward matching assets to liabilities may lead institutional investors to pursue a kind of 'core-satellite-model', where the major part of assets are invested in a relatively low-risk portfolio that more or less covers the nature of liabilities, and a small portion is allocated into a more risky and actively managed portfolio that is meant to generate alpha on top of the market return earned on the 'core'-portfolio, to meet clients' desire for excess returns or to be able to deliver an affordable pension product in the long term. These portfolios may be increasingly invested in alternative asset classes, like commodities and hedge funds.
- The impact of regulation is difficult to gauge, because the need for reducing risk may be viewed differently per institution. Some institutions may see a need to reduce their risks, others may not because if not bound by regulation they feel that matching liabilities by investing more in long fixed income instruments in a perceived environment of relatively low long-term interest rates may hamper them to earn sufficient returns to offer an affordable pension or insurance product in the long term.
- At this stage it is not clear whether the greater role of defined contribution schemes relatively to defined benefit ones implies more conservative portfolios (which would increase the share of bonds at the expense of equities) or the other way around. The available data does not point to any clear evidence on changes in the asset allocation of portfolios and, if any, it shows an increase of equities.

- Apart from the market for long-term bonds, there is not much evidence until now that institutional investors applying ALM techniques may have lead to greater behavioural uniformity, thus reducing liquidity in particular markets, increasing volatility and increasing concentration in exposures. On the contrary, it may rather be the shift from DB to DC plans that may lead to a more uniform and a more short-oriented management of portfolios in the industry.
- It is hard to quantify how large an effect the recent or prospective changes have had on the yield curve. First, in order to isolate the effect on the yield curve from the changes in accounting and regulation, all other factors must be subtracted or isolated. Second, the effect on local long-term yields from the changes will, at least to some extent, depend on country specific regulations and supervisory frameworks. Third, the ability to hedge the liabilities by buying foreign bonds might also differ between different countries and with different effect on local long-term yields. Fourth, the size of the duration mismatch of the institutions in a country will also affect the size of influence on local long-term yields. Hence, the effect on local long-term yields might differ between countries, but the effect might influence global yield curves through other investors' investment strategies and portfolio allocations.
- How large effect the regulatory changes will have on the long-term interest rates in the long-run is hard to say, and the effect might also vary across countries.
- Whether or not we are in the beginning of a large-scale phenomenon is still an open question, as the evidence so far is inconclusive. The effects will depend among other things on the size of the demand for long and ultra long bonds relative to the supply and on the price-elasticity of the demand of institutional investors.
- The greater allocation of resources to alternative investments by institutional investors has raised concerns with regard to the potential market impact of the more dynamic investment styles and the relative size of resources channelled to these markets. This issue has been debated extensively, especially in the context of hedge funds, although empirical evidence is rather scant and in most cases only circumstantial.
- All in all, the assessment on pricing of alternatives may seem quite positive, as a number of studies conclude that they contribute to greater liquidity and efficiency. However, some concerns remain especially with regard to the opacity of exposures or the pricing of these, especially if no tight relationship can be established between the price of the underlying assets and the price of the financial vehicle. Moreover, the functioning of markets under stress has not been yet tested.
- Despite the accounting and regulatory changes affecting the United Kingdom's funded pensions sector, the aggregate statistics suggest that the overall shift in UK pension funds' asset allocations has been fairly modest thus far. However, the new strategies adopted by pension funds trying to overcome the risk that excessive reliance on liability driven investment strategies alone would lock in the need for further increases in contributions may well have had far-reaching effects on market prices and dynamics in the UK. In particular, the earlier adoption of a market value-based accounting approach to pension fund valuation and the introduction of a new regulatory regime have had some influence on bond yields in the UK. This does not mean that the UK is likely to be a leading indicator of possible developments elsewhere if other countries make similar changes to their accounting and regulatory regimes. In certain respects, the UK is fairly unusual by international criteria.

Implications of recent or prospective regulatory changes for financial market prices and market dynamics

The market configuration that we have seen since 2003 has been unusual by recent historical measures: persistently low long-term yields, continuing low volatility, abundant liquidity, declining credit spreads for both private firms and emerging market economies resulting in little discrimination between issuers, and attendant sharp rises in the value of certain assets (residential real estate, equities, etc.).

The global economy has continued to enjoy very favourable monetary and financial conditions, whose corollary is abundant liquidity. This ongoing configuration has resulted in a more intense search for yield and apparently an increase in risk-taking.

The aforementioned trends have only been interrupted by self-contained and temporary episodes of volatility and corrections in the valuation of some financial assets, such as in May and June 2006, which suggest that particular attention must be given to interest rate changes given their impact on the valuation of financial assets.

To which extent price dynamics in financial markets relate to changes in the investment behaviour of institutional investors in response to regulatory changes? This study will consider possible explanations and implications in this regard. To this end, a number of conjectures dealing with different channels through which changing investment behaviour might influence market price dynamics are critically assessed.

1. Possible transmission channels for regulatory changes

Impact on long term interest rates through portfolio adaptations to reduce maturity mismatch

During recent years, changes in regulation, accounting and the supervisory framework have been suggested as one important factor behind the low long-term interest rates. Both the changes in accounting methods and the emphasis on risk management could have an effect on the investment strategies of pension funds, insurance companies and other institutional investors. It has appeared that a substantial number of pension funds, insurance companies and other institutional investors worldwide are faced with a maturity mismatch. With long-term liabilities on their balance sheets, and the maturity of their assets usually substantially lower, the environment of low interest rates has tended to exert downward pressure on funding ratios for the institutions under mark-to-market valuation. A possible global trend of institutions trying to narrow their duration gaps through changes in portfolio allocations could influence the shape of the yield curve and possibly the absolute level of long-term yields.

Increased demand for long term bonds

The changes could increase the institutions' demand for long-term bonds, nominal or inflation-linked, and hence affect the yields on bonds.

Purchases of long duration bonds by institutional investors for reasons of asset liability management may exert downward pressure on long-term interest rates, assuming that the supply is fixed, at least in the short term. In a fair value accounting world, a drop in long term

interest rates may visibly worsen the solvency of the investor as many institutional investors, in particular pension funds and insurance companies, are characterized by a liability duration that is longer than the duration of assets. This could induce even more buying of long duration bonds in order to decrease the duration gap, thus exerting further downward pressure on long term interest rates.

A separate development that may influence prices in the long term bond market is the closure of defined benefit (DB) pensions to new entrants possibly after the funding gap is closed by a lump sum payment from the sponsor. This may be an important source of duration buying because the subsequent lack of a supporting sponsor makes the matching of assets to liabilities more urgent: given that the old DB scheme often cannot fall back on the sponsor or raise employee contributions, the liabilities need to be fully hedged. As the trend toward closure of DB schemes continues, this may further increase the demand for long-term bonds.

In some countries, DC schemes are becoming more important in size than DB ones. It is important to note that as a rule DC schemes do not contain explicit promises to match any liabilities: the risks are borne by the ultimate receiver of the pension benefits. Thus, the management of the portfolio is not driven by ALM considerations. However, some explicit or implicit promises on the returns of the portfolio are usually contained in the mandates of the pension fund. The most popular one is to (at least) maintain the real value of the portfolio, which may stimulate the use of inflation hedging strategies. At this stage it is not clear whether this shift implies a change in the portfolio allocation favouring more conservative assignments (which would increase the share of bonds at the expense of equities) or the other way around. The available data does not point to any clear evidence on changes in the asset allocation of portfolios and, if any, it would imply an increase of equities

Increased demand for derivatives

There are other strategies that the institutions can use to increase the duration of their assets, mitigate the duration gap or hedge liabilities.

An increasingly popular way adopted by pension funds to reduce interest rate risk in the balance sheet is the use of an interest rate swap overlay. By buying long term swaps (i.e. receiving the fixed long term interest rate and paying Libor), funds are able to extend the duration of their portfolio to the desired level without having to change their strategic asset allocation. Pension funds may be reluctant to adopt significant changes to their strategic asset allocation for various reasons. Firstly, large shifts from one asset class to the other are costly. Secondly, many defined benefit pension funds seem to be reluctant to reduce the size of their equity portfolios because equities correlate reasonably well with the real characteristics of their liabilities and because many pension funds feel they need to earn the equity premium in order to be able to deliver an affordable pension product in the long term. Thirdly, the fixed income portfolio may be too small to engineer a sufficiently large duration extension using only cash instruments. Fourthly, the long term swap market is more liquid than the market for long duration bonds.

This raises the question what would be the possible impact on swap rates and swaps spreads at the long end of the yield curve. A potential problem in using interest rates swaps might be that the institutions are demanding the same leg, i.e. to receive the long-term fixed interest rate in exchange for the short-term rate. An interesting issue is who the natural counterparties in the swap contract are. These may be governments or corporations that have an interest in

extending the duration of their funding. Some government debt managers are known to be more or less active in using swap programs to extend the duration of their debt. For corporations, the picture is rather unclear. They could also just be market participants trading on a particular view on swap spreads or the absolute level of swap rates. Given the depth of both the euro and USD interest rate swap market the build up of swap overlays by institutional, provided they proceed gradually, should be absorbed without considerable price effect.

The institutions could also use swaptions or perhaps other products with embedded optionality to mitigate the risks from the duration gaps. However, also with this instrument the demand for the options may exceed the supply at current price levels.

Lower long term interest rates

The long run influence on long-term yields is conditioned on the supply of long-term bonds or other instruments that the institutions can use to mitigate duration gaps. With an increased supply of long dated bonds or inflation-indexed bonds, the effect should be smaller.

Impact on credit spreads through increased risk diversification

The low level of credit spreads can be linked to various factors. On the one hand, it may reflect an underpricing of risk as abundant liquidity helps to increase risk exposure. On the other hand, it may result from an improved distribution of risk against the background of rapid development of risk transfer mechanisms. The latter interpretation is consistent with the arrival of new non-bank players in the markets of risk transfer instruments, including the major institutional investors (investment funds, pension funds, insurance companies).

The global development of fair valuation and risk-oriented prudential requirements provides an additional incentive for insurance corporations and pension funds to increase their exposure to risk transfer instruments. Insurance corporations and pension funds may seek to resort to securitisation in order to transfer risk and limit the adverse effect to income volatility on their financial statement, e.g. bring regulatory capital requirements in line with economic capital.

France provides a significant example of such a trend. In the recent past, a large insurance company launched a motor insurance securitisation.

Securitisation techniques have already been used in the area of life insurance and catastrophe risk¹, but they had not yet been tailored to traditional property and casualty insurance, which focuses on high frequency, low severity risks. Such transactions may expand through the need to cover events with high frequency and low-severity loss characteristics such as car accidents, as they are likely to reduce both the cost of reinsurance and the counterparty risk on reinsurers.

From the viewpoint of the insurer, a securitisation deal of the benefit of reducing the cost and the counterparty risk associated with the transfer of risk through reinsurance; improving asset

¹ Insurance securitisation already exists under the form of catastrophe bonds, to hedge extreme risks with a low probability of occurring. For instance, issuance of catastrophe bonds (cat bonds) rose by 74% in 2005 according to Standard & Poor's, to reach USD 2 billion.

and liability management in the same way as banks, in the run-up to the Solvency II reform; improving internal control, as securitisation requires reliable, in-depth reporting; and freeing up regulatory capital (subject to approval by the supervisory authority).

In addition, the development of funds with relaxed investment rules, especially as regards the use of financial derivatives, should overall facilitate investment in complex derivatives.

Impact on market liquidity and volatility

Behaviour uniformity

In the context of the discussion on possible adaptations in asset allocation induced by regulatory changes, a more general question is whether these changes stimulate institutional investors to engage in the same kind of portfolio modifications, thus reducing liquidity in particular markets, increasing volatility and increasing concentration in exposures. Apart from the market for long-term bonds, where some manifestations may point towards increased demand from institutional investors, there is not much evidence until now that greater behavioural uniformity by institutional investors is a major issue, or that such behaviour may increase risks. In fact, from a conceptual point of view it is not immediately clear how asset allocation changes that reduce the overall risk in the balance sheet (assuming that ALM was the main reason for the allocation change) and are usually of a 'buy and hold' nature would increase exposures for institutional investors. However, one could envisage strong ALM-driven 'buy and hold' demand for particular assets in relatively small markets, such as the market for inflation-linked bonds, to have a negative effect on market liquidity. On the contrary, it is rather the shift from DB to DC plans that may lead to a more uniform and a more short-oriented management of portfolios in the industry. DC portfolio performance is assessed not according to their returns in relation to the liabilities but on their performance published periodically (yearly? quarterly?). A comparison with other funds, such as mutual funds, which in principle are guided according to more short-term considerations immediately follows.

New entrants to the equity market

Regulatory or accounting changes could create difficulties such as artificial volatility of balance sheets and income statements or inconsistencies in the practical implementation of the new rules. For instance, in the insurance sector, under IFRS4, the fair value measurement of insurance liabilities raises strong difficulties as there is no liquid market for insurance liabilities that could act as a benchmark, and the complexity of the products makes the construction of measurement models particularly difficult. The main risk is that the fair valuing of assets may result in increased equity and earnings volatility. In Phase I, this volatility will be even greater as liabilities are not fair valued. In Phase II, it should, however, decline if assets and liabilities are affected in the same way, for example by changes in interest rates. This volatility may push up the cost of financing if investors require a risk premium in return, result in wariness on the part of policyholders, who may then terminate their contracts, and prompt insurers to reduce the share of equities in their asset portfolios.

Such a situation may generate artificial opportunities for new investors on the equity market e.g. unregulated hedge funds and private equity funds with new incentive structures. Notwithstanding the impact of a low interest rate environment and the influence of the "search of yield", there may be already some signs of such developments reflected in the substantial growth recorded in the recent past in the activity of hedge funds and private equity

funds. These new shareholders seem to favour higher stock returns, increased corporate financial operations and limited corporate capital investment, which would also contribute to lower interest rates.

2. Assessment

Bond markets

It is hard to quantify how large an effect the recent or prospective changes have had on the yield curve, and also which yield curve to study. First, in order to isolate the effect on the yield curve from the changes in accounting and regulation, all other factors must be subtracted or isolated. Second, the effect on local long-term yields from the changes will, at least to some extent, depend on country specific regulations and supervisory frameworks. Third, the ability to hedge the liabilities through the use of foreign bonds might also differ between different countries and with different effect on local long-term yields. Fourth, the size of the duration mismatch of the institutions in a country will also affect the size of influence on local long-term yields. Hence, the effect on local long-term yields might differ between countries, but the effect will influence global yield curves through other investors' investment strategies and portfolio allocations. An example of this is the situation in 2001 when Danish pension funds simultaneously and during a short period of time made reallocations in their hedging positions against lower interest rates. The hedges were mainly made in European markets, due to the fixed exchange rate and the size of the Danish market. In the European markets long-term yields were consequently influenced by the hedging activities of the Danish funds.

The fact that interest rate models are not capable to explain all the changes in interest rates or to explain which factors affect the curvature does not necessarily imply that the unexplained part is due to changes or prospective changes in accounting or regulation. The long-term interest rates have probably also been affected by other investors speculating in an increased demand and hence higher prices due to the changes. Third market participants are known to have at times taken long positions in long-term interest rate instruments anticipating on increased duration buying by institutionals. However, their impact on pricing is uncertain. The result from the questionnaires seems to indicate that the portfolio allocation in most interviewed institutions and countries have been held constant despite the potential increased demand for duration. The fact that the portfolio allocations are constant does not, however, necessary imply that the institutions have not made any changes to the portfolios, the changes might have been implemented through using derivatives. If the institutions have used derivatives to do reallocations in their portfolios, some other institutions, i.e. the counterparties, may have gone long in long-term bonds with a downward pressure on long-term yields as a result. Hence, there are probably two forces affecting the long-term yields, increased demand from the institutions affected by new regulation and accounting changes as well as speculative investors.

How large effect the regulatory changes will have on the long-term interest rates in the long-run is hard to say, and the effect might also vary across countries. In a situation when short-term interest rates are lowered, i.e. a monetary easing, and the interest rate curve shifts downwards, the present value of the liabilities increase and, hence, the life insurance companies increase their demand for long-term bonds in order to match the liabilities and this might affect long-term yields, hence there is a feedback effect. The feedback effect is to some extent similar in nature to the prepayment effect in MBS, and could induce higher volatility in

both equity and bond markets, and in particular when short-term interest rates decrease sharply.²

Furthermore, whether or not we are in the beginning of a broad-based phenomenon is still an open question, as the evidence so far is inconclusive. The full effect might be larger, at least initially due to the speculative positions in long-term bonds with some potential overshooting as a result. A potential risk is that speculative allocations and positions in long-term bonds will trigger an increased demand for long-term bonds which will again, by reducing yields and thereby triggering a further incentive for reducing interest rate risk, increase the demand. The self fulfilling price spirals could, under the condition of a fixed supply of long term bonds, be initiated from speculative investors.

The likelihood of such a scenario depends of course on the demand for long duration bonds relative to the size of the market, and the price-elasticity of the demand for such instruments emanating from institutional investors. When taking the size of pension fund balance sheets as a proxy for potential demand for long-term bonds, it appears that potential demand significantly exceeds the size of the market in the US, the UK, Canada and Switzerland. In these countries, the price impact could be, and in fact has been in the case of the UK, significant. In the euro area and Japan the size of the market seems to be larger relative to potential demand (the picture might change if one takes insurance companies into account, as the pension fund sector in the UK is relatively large). An underlying assumption here is that institutional investors have a strong home bias when investing in fixed income securities. This may be true for some sectors or in some countries, but others may be well diversified (e.g. pension funds in the Netherlands nowadays do not display a noticeable home bias in their investment policy). As currency hedging becomes more and more common practice, this may remove a hurdle for more international portfolio diversification. As fixed income portfolios get more internationally diversified, the possible effect of increased demand for long dated bonds on interest rates may become more evenly spread across markets.

Another underlying assumption is that supply is static in the short run. However, in the medium term downward pressure on long term interest rates may trigger a supply response by government debt management agencies and possibly corporations as well. In fact, recent supply developments support the notion that supply does respond eventually. Most notable was the issuance of bonds with maturities of 50 years by the French and UK governments. An agency sponsored by the Japanese government issued 40-year bonds in December 2005. In February 2006, the US treasury reintroduced a 30-year bond, and the Dutch treasury agency issued a 30-year bond in April 2005.

The interest elasticity of demand depends, among other things, on the perceived urgency of the portfolio changes. This may differ per institution. Regulatory changes, be it on the accounting side or on the side of the supervisor, do not require portfolio changes per se. The need for asset allocation changes depends on a number of factors. Firstly, the size of balance sheet risks: the smaller these risks, the lesser the need to reduce them. Secondly, the stronger the solvency position of the institution, the less need there is to reduce balance sheet risks. In that regard, also the flexibility of the supervisory regime is an important determinant. For example, under the new solvency regime in the Netherlands pension funds are granted a period of 15 years to build up their risk-weighted funding buffer. A third factor is the level of long-term interest rates. As a general notion, institutional investors, which are typically long-

² See Roberto Perli and Brian Sack "Does Mortgage Hedging Amplify Movements in Long-term Interest Rates?", Finance and Economics Discussion Series, 2003-49.

term investors, would probably be reluctant to lock in returns at a low level of long-term interest rates, unless they are forced by their balance sheet situation or their sponsor company or supervisor. This mechanism should function as a cushion against volatility.

A risk could be that pension funds for tactical reasons postpone their portfolio changes, and that unfavourable price dynamics in financial markets forces them to buy duration within a compressed time frame and during unfavourable conditions. Such a scenario may cause volatility in particular market segments in the short term, especially if speculative accounts make anticipating trades. On the other hand, risk-based solvency requirements will in the long-term enable institutional investors, by requiring them to hold sufficient financial buffers to support their balance sheet risks, to take a long-term view in their investment decision and sit through temporary bouts of market turbulence. This should, if anything, rather reduce than enhance market volatility.

All in all, given the availability of other instruments to comply with solvency regulation, and provided that transition periods are sufficiently long, any portfolio changes, if necessary, should be able to take place gradually, thus limiting the likelihood of excessive market volatility.

Credit markets

Greater risk diversification among financial institutions (and at least partially linked to regulatory changes) reduces the vulnerability of the financial system, which is consistent with low credit spreads. However, the contribution of regulatory changes to the reduction of credit spreads must not be overestimated and does not prevent from a sudden rise of credit spreads when shocks occur.

Emerging markets

As regards emerging markets, region or country-specific risks remain a matter of concern, as an unwinding of the search for yield in global financial markets may again highlight some enduring vulnerabilities. Some of these weaknesses seem for example to hold for some emerging European countries which might currently benefit from a “European integration process umbrella” in terms of financial market risk assessment. However, this might not last as experience shows that market participants can move quickly from exaggerated optimism to exacerbated pessimism.

Corporate markets

Growing securitisation could facilitate the transmission of strains in the insurance sector of a given country to other sectors or to other geographic areas. A number of challenges remain also to be met, such as the robustness of pricing models and the accurate assessment of the quantity of risk transferred to the markets. As is the case for many financial innovations, uncertainties remain as to the reliability and the robustness of the statistical models used to value shares in the special purpose vehicles, especially due to the lack of historical data and the fact that credit rating agencies seem less capable of assessing the risk of this instrument.

As regards credit derivatives, most of them, including the most complex products e.g. synthetic collateralised debt obligations (CDOs) have not been really tested under conditions of stress.

Valuation of portfolio holdings of complex and less liquid instruments should also take into account the lack of reliable market prices and the limited ability of current internal models and assumptions used to price them. However, the IFRS accounting standards might complicate this task, as they do not allow for the deduction of haircuts related to model risk or liquidity risk.

Equity markets

As for the implementation of IAS/IFRS, stock markets have shown little response to the first presentation in 2005 of listed groups' consolidated accounts under International Financial Reporting Standards (IFRS), no doubt due to the fact that analysts had factored in the effects of this restatement. Furthermore, in France it appears that, in practice, groups have hardly taken into account the aspects of IFRS that are difficult to apprehend, generally relating to fair value. A recent report by the Eurosystem Committee of Banking Supervision dealing with "the possible impact of accounting rules on financial stability" actually indicates an uneven application of the standards across countries and within the financial sector, with some evidence of a disorderly implementation in the insurance sector. However, it should be noted that, under the 1991 Insurance Directive, European insurers have to report assets at market value and, to date, the disclosure of this information has not had any negative consequences.

As regards the behaviour of new entrants and its impact on equity prices, trends in the leveraged buy out (LBO) market must be noted in this regard. Over the last two years, small caps outperformed mid caps and especially large caps. These diverging trends appear to reflect greater risk taking among investors, as small caps carry a higher liquidity risk and are more sensitive to fluctuations in economic growth. However, their strong performance can also be attributed to the expansion in leveraged buy-out (LBO) activity in this segment, fuelled by increased borrowing in a low interest rate environment. As they are able to increase their leverage significantly and inexpensively, large amounts of capital can be raised, and LBOs funds are of an unusually large size. The LBO structures initiating many of these transactions are based on increasingly high leverage and involve mechanisms that contribute to pushing up expected sale and purchase prices.

Alternative asset classes

Alternative asset classes cover a wide spectrum of investment opportunities, including hedge funds, funds of hedge funds, private equity, real estate, commodities, hybrid mutual funds, etc. The increase use of alternative investments by institutional investors constitutes a well established trend at least since the early 1990s. Furthermore, it is expected to record additional growth in the coming years insofar. The most obvious reason underpinning this greater interest is the desire for alternative (uncorrelated) sources of returns and increased diversification of the portfolio, which ultimately mean improvements in the optimal risk-return frontier.

However, the introduction of alternatives has not only been aimed at increasing the efficiency in the portfolio allocation. In a context characterized by a greater role of ALM techniques, certain institutions -including under-funded defined benefit pension plans- have increased exposure to some of the alternatives because of their liability-hedging properties. Alternatives provide a useful vehicle for objectives such as to obtain a high correlation between the returns

of assets and liabilities, to reduce the portfolio's volatility, to immunise the portfolio's duration or to hedge inflation compromises.

An additional factor underpinning the demand for alternative asset classes related to the increased trend toward matching assets to liabilities is the extent to which it may lead institutional investors to pursue a kind of 'core-satellite-model', where the major part of assets are invested in a relatively low-risk portfolio to cover the nature of liabilities, and a small portion is allocated into a more risky and actively managed portfolio. This latter portion would be meant to generate alpha on top of the market return earned on the 'core'-portfolio, to meet clients' desires for excess returns or indexation ambitions for pension receivers.

Increased allocation of alternative investments

According to subsequent biennial Goldman Sachs & Russell Surveys on Alternative Investing, the use of alternatives by large institutions managing tax-exempt assets (endowments, foundations, public and corporate pension plans) has shown a rapid growth in the last 20 years. Moreover, the last available report³ shows that among alternatives, hedge funds are attracting the biggest share of new commitments. This asset class is adding to private equity and real estate, which had already become a significant part of institutional investors' portfolios since early 1980s.

These trends are also evident in the study carried out by State Street Corporation at the 2005 Global ARC conference in Boston, which shows that institutional investors (same grouping as in Russell) continue to increase their allocation to alternative investment vehicles. According to this study, 48% of institutional investors have 5% or more of their portfolios invested in hedge funds and 90% have included private equity assets in their portfolios. Interestingly, most respondents said that new allocations to both hedge funds and private equity are at the expense of existing equity allocations. In a sense, this latter fact is in line with the so called core-satellite model.

Funds of Hedge Funds have also become widely used investment vehicles. They provide institutional investors with a convenient structured exposure to hedge funds because, among other things, they allow for a diversification of the idiosyncratic and operational risks of individual hedge funds. This is particularly important for some investors which are reluctant to invest in individual hedge funds because of concerns on the low transparency of the latter and the high attrition rate in the industry. Pioneer Alternative Investments carried out a survey on UK pension fund attitudes to hedge funds, which indicated that Funds of Hedge Funds have been the most preferred hedge fund vehicle. It is important to note that the operational risk is considered to be the most problematic issue in dealing with hedge funds; by investing in funds of funds the operational risk of individual entities is to some extent circumvented.

Evidence on the relative importance of institutional investors in the demand for hedge funds is provided by the Hennessee Group LLC. According to its estimates, pension funds and funds of hedge funds amounted to 39% of the capital invested in hedge funds at end of 2004, a figure significantly higher than the 21% observed in 1996. High Net Worth Individuals (HNWI), which had traditionally been the most important investors in hedge funds, had reduced their share in hedge funds' capital from 60% at end-1996 to 44% at end-2004. The increasing importance of institutional investors (pension funds, insurance companies,

³ The 2005-2006 report has exclusively been sponsored by Russell Investment Group.

endowments) and also financial institutions as net subscribers to hedge funds has had an impact on the strategies followed by the latter. Initially, the management of the portfolio responded to a model that tried to obtain high returns assuming high risks, whereas the presence of institutional investors and financial institutions has motivated a change in the management of the portfolio - with more stringent controls especially in terms of risk management - aimed at preserving the return on the capital and with lower tolerance of high risks.

Within the European context, Prospera Research published in AIMA Journal (December 2004) a study where the increasing role played by European institutional investors in the hedge fund industry is highlighted. According to this, 38% of surveyed European institutions invest in hedge funds an average allocation of 3.6% of the portfolio, although significant regional discrepancies are also acknowledged. In the British context, JP Morgan Fleming Asset Management estimates that 12% of pension funds in the United Kingdom have invested in hedge funds or alternative investments, with an average allocation of 4.8% of their portfolio.

The exposure of institutional investors to alternatives has also taken place through regulated markets. Two options will be briefly described in this section, Alternative Investment Markets (AIM) and Exchange Traded Funds (ETFs).

AIMs have registered record levels of activity in the listing of companies and the money raised by private equity and property investment, to a great extent helped by the interest of institutional investors. AIM constitutes a natural exit route for venture capital and private equity. By trading private equity and property investment funds in organised markets, the interest of institutional investors has been attained, as they offer greater transparency in the pricing and a higher degree of liquidity for the money invested. AIMs have provided new opportunities to get exposure to firms or market segments that otherwise had not benefited from these investors' interests. On top of this, certain improvements in the negotiation of these securities have reduced the cost of trading and increased trading volumes, factors that have attracted more institutional investment into the small cap, mid cap and AIM markets.

Another vehicle extensively used by institutional investors has been Exchange Traded Funds (ETFs). These are index and usually open-ended funds, which mirror the returns of certain market indexes. Contrary to open ended funds such as mutual funds, they trade in a stock exchange. Though initially they grew in the context of the index fund industry and constituted an alternative to mutual funds, ETFs have also been used to substitute direct hedge fund exposures and, especially in the late 1990s, as a vehicle to get exposure to (or hedge) equity movements. It is noticeable that after the equity bust ETFs have maintained a strong growth. ETFs constitute also a vehicle to diversify the portfolio by sector or internationally. They have low trading costs and permit an entire portfolio to be bought through a single operation. A majority of ETFs are traded in the US, in Amex..

The Investment Company Institute provides figures on the number and assets under management of ETFs, detailed by the investment objective and the legal status. A comparison of US developments with that of European ETFs is found in Seddik (2006)⁴. Interestingly, in the European context the role of banks and financial institutions is far greater than in the American. Fixed income ETFs represent only a small portion of equity ETFs because bond

⁴ A. Seddik Meziani (2006), "Exchange-Traded Funds as an Investment Option", Palgrave, Mc. Millan

indices are quite difficult to track and in the light also of a low demand for these indices in the present context of low returns on debt.

Impact on asset pricing, market liquidity and volatility arising from the greater demand for alternatives:

The greater allocation of resources to alternatives by institutional investors has raised concerns with regard to the potential market impact of the more dynamic investment styles and the relative size of resources channelled to these markets. Although alternative assets remain of limited importance in the portfolios of institutional investors, given the large size of the latter, a small increase in the allocation of alternative investments could have a bearing on the pricing of these assets, as well as on their market dynamics. The opacity of some of these vehicles, and considerations on tail risks and untested markets in conditions of stress has also arisen some concerns.

These issues have been debated extensively, especially in the context of hedge funds, though empirical evidence is rather scant and in most cases only circumstantial. Taking into account the prominent role played by some hedge funds in some recent episodes of financial stress, - for instance the ERM crisis in 1992 and the LTCM debacle - a large debate on whether hedge funds constitute a threat to the correct functioning of markets, or alternatively provide liquidity to markets, play contrarian positions and exploit arbitrage opportunities, has been ongoing. Unfortunately, little (if any) hard evidence linking hedge fund strategies and financial price developments or market volatility is available. Most of the existing evidence relates to whether large market participants or highly leveraged institutions (including hedge funds) herd to other investors or themselves, or the extent to which volatility increases as a consequence of positive feedback trading techniques.

Eichengreen and Mathieson (1998)⁵, in the wake of the 1997 turbulence in Asian currency markets, provided a set of studies on the effects of hedge funds' strategies on price dynamics. In this volume, L Kodres collects some evidence on the effects of hedge funds' strategies on financial price dynamics. According to it, not only do hedge funds not show a contemporaneous herding with other institutional investors, but there exists a statistically significant negative correlation between position changes of hedge funds and other market participants. Fung and Hsieh (1997)⁶ analyse investment styles of hedge funds and commodity trading advisors and conclude that strategies followed by hedge funds are uncorrelated with the buy-and-hold strategies used by US mutual funds. Therefore they suggest that instead of contributing to excess volatility hedge funds - by acting as contrarians - lower volatility. In a later study, Fung and Hsieh (2000)⁷ estimate hedge fund exposures during a number of major market events – the 1987 stock market crash, the 1992 European Exchange Rate Mechanism crisis, the 1994 bond market turbulence, the 1997 Asian crisis, etc. – in order to check whether they had any market impact. They conclude that there is no evidence that hedge funds systematically caused market prices to deviate from economic fundamentals, nor do they find evidence of positive feedback trading or herding other investors, although admittedly in some cases hedge funds contributed to market volatility

⁵ B. Eichengreen, D. Mathieson et al (May 1998), "Hedge funds and Financial Market Dynamics", IMF, Occasional Paper 166.

⁶ W. Fung and David A.Hsieh (1977), "Empirical Characteristics of Dynamic Trading Strategies: The Case of Hedge Funds", Review of Financial Studies, Vol 10 (Summer), pp 275-302.

⁷ W. Fung and David A. Hsieh (2000), "Measuring the Impact of Hedge Funds", Journal of Empirical Finance 7, pp 1-36

It is also important to note that the Financial Stability Forum set up a working group to study the implications of the operations of Highly Leveraged Institutions (HLI), mainly hedge funds, for stability and market dynamics. In early 2000 the FSF published a report, and later on they reviewed progress on the implementation of recommendations contained in the report. In these reviews, the FSF concluded that the capacity of HLI to disrupt markets had diminished due to greater market discipline, improvements in counterparty risk management practices, some advances in hedge fund disclosures, a scaling down of the leverage in the positions of these institutions and strengthened surveillance and oversight. This greater market discipline had also been confirmed by the IMF (2001) in an update to the note on the hedge fund industry they had presented to the working group of FSF.

With regard to pricing concerns related to the exposure to alternates by institutional investors through organised markets, they are obviously less acute. They basically relate to the liquidity of these markets and to the possibility that prices depart significantly from fundamental or equilibrium values.

EFT pricing and liquidity stem from the creation and redemption process and from the trading of shares in the secondary market. Although trading of ETF shares might in principle allow for differences in the price of the fund in relation to the net asset value of the basket of assets constituting the ETF share, it is important to note that ETFs are open ended funds and, through the process of creating or redeeming new shares, arbitrage ensures a close alignment of the pricing of the ETF to the net asset value of the fund. Smith Barney in Sedikk (2006)⁸ show evidence that ETFs do not trade at a significant discount or premium over their net asset value, although other studies show that some discrepancies are admitted. Most of any “mispricing” is related to the costs of arbitrage associated with the creation and redemption of foreign ETFs. Little evidence is also found of herd behaviour. Gleason, Mathur and Peterson (2004)⁹ examine whether traders herd during periods of extreme market movements using sector ETFs. Their results suggest that investors do not herd using ETFs and that the market reaction to news is not symmetric for up markets and down markets.

A very positive assessment on ETFs is Hedge and McDermott (2004)¹⁰. According to it ETFs have improved the liquidity of underlying stocks and increased the volume of trading and open interest in futures markets. It is interesting also to note that the liquidity of ETFs is not only dependent on the daily average trading of shares, but on the liquidity of the underlying stocks. It is thought that Broad-based ETFs are relatively liquid. However, it is not so evident for more specific ETFs linked to sectors that are not very well diversified. This issue may be particularly important for those institutional investors aiming at diversifying internationally via ETFs, since some country indexes may be poorly diversified.

All in all, the assessment on pricing of alternatives may seem quite positive. However, it should not lead to complacency, especially in regard to the pricing of exposures where no tight relationship can be established between the price of the underlying assets and the price of the financial vehicle. In these cases due diligence and prudence is obviously guaranteed. For instance, the illiquidity of some exposures, the infrequent pricing of some alternative

⁸ Opus cit.

⁹ Kimberly C. Gleason, Ike Mathur and Mark A. Peterson (2004), “Analysis of Intraday Herding Behaviour among the Sectors ETFs”, *Journal of Empirical Finance* 11, pp 681-694.

¹⁰ Hedge, Shantamaram P. And Jhon B. MC Dermott (2004), “Market liquidity of Diamonds and Cubes and their Underlying Stocks”, *Journal of Banking and Finance*, May 2004, pp- 1043-1057.

assets and the smoothing techniques used to calculate the returns of portfolios are aspects that need to be closely monitored.

In the context of hedge funds Getmansky et al (2004)¹¹ show that returns are highly serially correlated in comparison with the returns of more traditional investment vehicles such as mutual funds. According to this study the most likely explanations for this high correlation are asset illiquidity and smoothing of returns. If this is the case, volatility is understated and risk-adjusted performance measures, such as the Sharpe ratio, are overestimated. Another example of exposures to infrequently priced assets is that of real estate. Certainly real estate has played a useful role for institutional investors for decades, as it has provided a way to diversify portfolios, to obtain high returns and to hedge inflation risks. To these ends, unlisted properties seemed to have worked well, but the un-frequent pricing of real estate, only updated quarterly, and the low liquidity are aspects that should be taken into account. Real estate investment trusts allow for higher frequency pricing, but these investments are shown to be less efficient in terms of diversification, taking into account correlation with equities.

3. Lessons from the British experience

This section summarises the main accounting and regulatory changes affecting the United Kingdom's funded pensions sector and considers whether the earlier adoption of these changes than in other countries and the resulting effects on financial market prices and dynamics carry any lessons for other countries contemplating the introduction of similar reforms.

On the accounting front, the UK made the early running on the application of Fair Value Accounting (FVA) concepts to the pensions area, with the publication back in November 2000 of FRS 17 "Retirement Benefits" by the Accounting Standards Board. FRS 17 required that: (i) pension scheme assets be measured at market prices; (ii) pension scheme liabilities be discounted using the rate of return on an AA-rated corporate bond of average equivalent term; (iii) pension scheme surpluses and deficits be fully recognised on the sponsor's balance sheet; (iv) service and interest costs and asset returns feeding into changes in the pension fund balance be taken to the profit and loss account; and (v) actuarial gains and losses be recognised in full and immediately in the statement of total recognised gains and losses.

Although the full implementation of FRS 17 in the UK was delayed until 1 January 2005, estimates of the pension scheme position calculated in accordance with its provisions had to be provided in notes to the sponsoring company's annual report and accounts during the period 2001-05. FRS 17 went further than corresponding accounting standards in other countries in moving away from a smoothing methodology, which tended to dampen down the effect on company accounts of fluctuations in pension scheme asset values, to the use of market prices to value the assets in those accounts. In the US, for example, SFAS 87 allowed gains and losses in asset values and overall returns to be smoothed over periods of five years, whereas FRS 17 required them to be recognised in full immediately. A similar difference existed between FRS 17 and the corresponding international standard IAS 19.

On the liabilities side, FRS 17's selection of the AA corporate bond yield as the discount rate was intended to remedy the problems with the previous UK standard, SSAP 24, which had allowed plan sponsors to discount liabilities at the same rate as the expected return on plan

¹¹ Getmansky, M.m Lo, A. And I. Makarov (2004), "An Econometric Analysis of Serial Correlation and Illiquidity in Hedge-Fund Returns", Journal of Financial Economics, forthcoming.

assets. This had induced many sponsors to over-state the pensions funding position by selecting an over-optimistic rate of return assumption, thereby inflating assets and lowering the present value of liabilities.

Discussions are currently proceeding among the international community as to whether to move to a full FVA approach to valuing pension assets and liabilities, along the lines of that adopted in the UK. It should be noted, moreover, that the UK has reinforced the FVA approach by its recent regulatory changes in the pensions area. The Pensions Act of 2004 introduced new funding regulations, which took effect from December 2005. These generally required pension fund trustees to value their funds using market prices for assets and long-term government bond yields as discount rates to derive present values of their liabilities. If a scheme is in deficit on this valuation basis, the trustees and company sponsor have to address the implied underfunding and demonstrate how they plan to eliminate the deficit over a period of ten years. The Act also establishes a Pension Protection Fund (PPF) to protect members of defined benefit (DB) pension schemes by paying compensation if their employer becomes insolvent and the pension scheme is underfunded. The PPF is financed by levies charged on schemes, with 80% of the levy related to the risk of a scheme not being able to meet its obligations. Schemes with large deficits therefore pay more in levies than those with small deficits.

By requiring that DB pension funding shortfalls have to be fully recognised immediately on the balance sheet, eliminated over time and linked to PPF levies, these accounting and regulatory changes are likely to have increased trustees' and corporate sponsors' determination to remedy underfunding problems as quickly as possible and with as little risk as possible. This is being done in the first instance by increasing employers' contributions, which have approximately doubled (from £15bn to £30bn) in the past three years. Secondly, to avoid the risk of future renewed deteriorations in their funding positions, some UK pension schemes are adopting "liability-driven investment" (LDI) strategies, seeking to invest a greater proportion of portfolios in assets that match the characteristics of the fund's liabilities, such as very long-maturity government and corporate bonds, and to use swaps to hedge interest rate and inflation risks. And finally, with increasing longevity raising the costs to companies of DB schemes, many UK sponsors are closing DB schemes to new members and switching to defined contribution (DC) schemes, in which the risks are entirely shifted to the employees. According to survey estimates collected by the National Association of Pension Funds, some 54% of all UK DB schemes closed to new members between end-2001 and end-2004.

Despite these profound changes, the aggregate statistics suggest that the overall shift in UK pension funds' asset allocations has been fairly modest thus far. This reflects the fact that not all pension funds have switched to LDI strategies as yet and those that have are tending to combine asset-liability matching with a more aggressive approach to asset management through "alpha" strategies designed to increase returns. The typical asset allocation resulting from this combination of policies would involve a fixed income and swap portfolio that broadly matched a proportion of pension liabilities, together with some low-risk assets to earn the LIBOR-related payments on the swaps, together with some higher-risk assets designed to close deficits and reduce the need for higher contributions in future by earning higher long-term returns. Such strategies are designed to overcome the risk that excessive reliance on LDI strategies alone would lock in the need for further increases in contributions.

These new strategies may well have had far-reaching effects on market prices and dynamics in the UK. The greater focus on asset-liability matching may have raised the price-inelasticity of demand in the UK longer-term conventional and, especially, index-linked government bond markets. Increasing demand for longer-dated government and corporate bonds has put downward pressure on long-term yields in those markets, which has in turn raised the present value of pension scheme liabilities as calculated under the new regulatory funding and accounting requirements. Given that most schemes have started from a position of much less than perfect liability matching (implying a duration mismatch), this adverse effect on liabilities has dominated the beneficial effect of higher bond prices on assets, resulting in further deteriorations in the funding positions, further increases in demand for long-dated bonds and further falls in long-term interest rates.

The result has been that UK real rates on ten-year government bonds, after averaging just over 2% from early 2001 to late 2003, fell to below 1% by January 2006. Although this fall partly mirrored a similar fall in both the US and EU over this period, and to some extent may therefore reflect global influences such as a possible glut of savings worldwide, the fall was greater in magnitude in the UK and associated with a significantly more inverted yield curve, especially at maturities much greater than ten years¹². For example, yields on 30-year and 50-year index-linked gilts fell as low as 0.9% and 0.7% respectively in early 2006, well below a neutral yield of around 2.25% (in line with a conservative estimate of the UK economy's trend rate of growth).

Global bond yields have risen somewhat from their low point in mid-February, with this rise roughly split between a rise in expected future real rates and in inflation expectations. The latter may be associated with the sharp increases in the prices of oil and other commodities over the past year. As a very open economy, the UK has clearly not been immune from this development. But UK real yields remain significantly lower than elsewhere in the EU and in the US at very long maturities. For example, the real yields on 30-year and 50-year conventional UK government bonds were still as low as 1.4% and 1.2% respectively (ie still inverted) in March. This suggests that factors peculiar to the UK have had some influence on these market prices and dynamics. Two such factors may have been the earlier adoption of a market value-based accounting approach to pension fund valuation and the introduction of a new regulatory regime.

This does not mean that the UK is likely to be a leading indicator of possible developments elsewhere if other countries make similar changes to their accounting and regulatory regimes. In certain respects, the UK is fairly unusual by international criteria. In particular, it has much greater DB pension coverage per head of the population than virtually any other country. Notwithstanding the recent closures of DB schemes to new members, the UK DB sector remains huge, with around 14.9 million active and pensioner (current and deferred) members (over a quarter of the population) in nearly 10,000 schemes. The overall relative size of the funded pension sector in the UK means that pension funds' assets account for a greater multiple of GDP than in almost any other country.

¹² It should be noted that UK real yields are generally deflated by the RPI, whereas US and EU real yields are deflated by the CPI. Given that RPI inflation in the UK has on average exceeded CPI inflation by 80 basis points, UK real yields would be on average 80 basis points higher if deflated by the CPI. But even on this basis, UK government bond yields would currently be significantly below US and EU government bond yields at all maturities above ten years.

It follows that only a modest proportion of those assets need to be switched to long-term bonds, as part of the move to LDI strategies, to have a significant effect on prices and dynamics though exacerbating existing demand-supply imbalances in the market. The supply of very long-term government conventional and index-linked bonds is limited in the UK and likely to be fairly price-inelastic. For example, at the end of 2005 Q3, the current market value of the index-linked gilt market was only £111bn. And it is also unlikely that the limited supply of very long-term UK government debt can be supplemented by significantly greater amounts of high-quality corporate debt. Few UK companies, especially the higher-rated companies – which tend anyway to be fairly cash-rich – need to borrow for such long periods. When account is also taken of the much smaller free float in these markets, with many existing securities held to maturity by institutional investors, it is apparent that even a modest shift into long-term government bonds by a relatively small proportion of the very many UK DB schemes could have a big impact on market prices. It is this unusual imbalance between substantial potential demand and limited actual supply, at a time of low global bond yields, that appears to be at the heart of recent UK bond market developments.

Turning to market prices more generally, the growing recourse to alpha strategies may also be having important effects. It can be regarded as an aspect of the search for yield that has contributed in recent years to a compression of credit spreads and other market-based indicators of risk, possibly to levels that give an overly optimistic picture of the degree of underlying risk in financial markets. Unlike the bond market developments, which as noted above to some extent reflect factors unique to the UK and therefore have limited implications for other countries that are currently considering the adoption of similar reforms in the pensions regulatory and accounting areas, the search for yield is a global phenomenon. The consequential fall in credit spreads and other market-based indicators of risk has also occurred in many countries other than the UK. It therefore has implications for the correct assessment of financial market risks on a global basis. If global yields have been driven to historic lows partly by an aggressive search for yield, they may be presenting a misleading picture of the robustness of financial systems in many countries.