Pension Fund Investment and Regulation: An International Perspective and Implications for China's Pension System

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Executive summary

Pension fund assets in OECD countries have increased rapidly over the past decades (OECD 2007a), and it is evident that such trend will continue. Against this background the issue of how to invest such a large amount of assets has become increasingly important, and also has policy implications. Broadly speaking pension funds around the globe have been subject to two approaches, i.e. quantitative asset restrictions (QAR) and the prudent person rule (PPR). In this paper we first review how pension funds are regulated in both OECD and non-OECD countries. Next, the existing regulatory framework of funded pensions in China is reviewed (consisting of the mandatory personal account and Enterprise Annuities - i.e. voluntary occupational pensions). Finally, we conduct a simple empirical study, investigating quantitatively the extent to which potential benefits could be achieved if the current QAR approach in China is shifted towards a more liberalised regulatory approach. Given our empirical results which support the PPR in China, a number of policy recommendations are proposed in order to strengthen the existing pension regulations. They include a removal of lower limits on certain asset classes, consideration of allowing pension assets to be invested abroad etc.

Classification codes: G23, G18

Keywords: Pension funds, pension regulation, quantitative asset restriction, prudent person rule, enterprise annuities, China

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1. Introduction

Pension fund assets in the OECD area have been in rapid increase over the past decades, largely due to ageing populations and reforms increasing funded pensions in many countries. For example, the latest statistics (OECD 2007a) show that total funded pension assets in 30 OECD countries in 2006 was equivalent to USD 14.7 trillion, which accounted for 73.9% of GDP. It is almost certain that the global pension fund market will continue its expansion in the foreseeable future. Against this background the issue of how pension assets are invested becomes an important issue. In this regard, authorities have a policy concern about the investment performance of pension fund assets, otherwise shortfalls in required retirement income will have to be met by the nation state (Clark and Hu 2005). Broadly speaking, there are two forms of government policies relating to pension fund investment; one involves strict quantitative asset restrictions (QAR), where the government makes specific regulations, typically on the limits of holding a particular class of assets. The other approach is termed as prudent person rule (PPR), in which pension funds are invested prudently as someone would do in the conduct of his or her own affairs, i.e. there is generally no any strict restriction on particular assets.

It should be stressed that these two approaches are not mutually exclusive. Indeed, there is a continuum of approaches between a "pure" QAR and a "pure" PPR with most countries lying somewhere in between. The OECD Guidelines on Pension Fund Asset Management recognise the validity of both approaches and require the implementation of the PPR approach but also permit some quantitative restrictions that are consistent with the goal of diversification, such as limits on portfolio investment in a single issue or issuer (and especially on 'self-investment', that is investment in assets of the plan sponsor, provider or asset manager).

While a few countries (primarily non-OECD countries) still only apply the relatively crude first block of quantitative limits, most OECD countries have reduced the number of these and also apply the PPR approach. A number of countries are additionally moving towards a more direct form of monitoring

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investment risk, which seeks to quantify it and proactively tackle potential problems in order to prevent debilitating investment losses from occurring.

In China pension funds (i.e. mandatory, individual accounts and Enterprise Annuities) have been subject to QAR regulations, particularly the mandatory individual accounts which form part of the public pension system. Although the total amount of funded pension assets is currently small, it is evident that the pension market in China will grow rapidly in the near future. Therefore current investment regulations are likely to be not only counter-conducive to promoting the development of the Chinese pension market, but also – more importantly - have the potential risk of hindering the achievement of higher returns, therefore eventually reducing benefits for plan members.

In this paper we first review pension fund regulation issues in OECD and non-OECD countries with a focus on international experiences of the two approaches, i.e. QAR and PPR. In this part (consisting of Sections 2 and 3) we also draw on the OECD Guidelines on Pension Fund Asset Management and a recent survey on portfolio limits conducted by the OECD. In Section 4 we discuss existing pension fund investment regulations in China, in which the emphasis is on funded pension assets. Section 5 analyses the quantitative effects of liberalising current asset restrictions in China towards a more diversified investment approach (e.g. PPR), by conducting a simple empirical study. Section 6 concludes this paper with several specific policy recommendations for China's pension fund investment regulation.

2. Quantitative limits

2.1 OECD Guidelines on the use of investment limits

The OECD 'Guidelines on Pension Fund Asset Management' released in 2005 address the issue of using quantitative limits for controlling investment risk. The guidelines allow for the use of quantitative limits as they can serve to establish important boundaries that prevent or inhibit inappropriate or extreme investment management decisions. They may be applied to ensure a minimum degree of diversification and asset-liability matching, promoting the prudential principles of security, profitability, and liquidity pursuant to which assets should be invested.

As well as maximum levels within asset classes, the guidelines state that a list of admitted or recommended assets (at a broad level) may also be produced by the supervisor (either on a compulsory or voluntary / 'comply or explain' basis). Likewise the guidelines allow that certain categories of investment may be strictly limited (for instance loans without appropriate guarantees, unquoted shares, certain equities which may raise major risks of conflicts of interest, illiquid assets, and, in general, investments that lack sufficient transparency). The guidelines also note that where category ceilings are established, there should also be a procedure for correcting excesses within specified time limits. The use of derivatives may also be specifically addressed (e.g. those with unlimited commitments or for speculative purposes should be prohibited).

The only actual quantitative limit recommended by the guidelines is that of self-investment (maximum 5%, 10% for group holdings). Interestingly, even countries which have adopted the prudent person approach to controlling investment risk often still apply such self-investment limits – these being in effect an expression of aspects of the prudent person rule.

Limitations and dangers of quantitative rules

The OECD guidelines, however, equally warn that quantitative limits should be applied with care. For example, minimum investment limits (or floors) are not recommended – as these force pension funds to

invest specified portions of their portfolios in particular asset categories, leaving pension fund asset managers no or little ability to walk away from what they might determine to be unwise or inappropriate investments and may artificially inflate asset prices (Hu 2006a). Likewise limits which impede diversification (at home or abroad) or asset-liability matching – both of which are suitable investment goals – should also be avoided. As a check, the guidelines recommend that quantitative portfolio limits should be regularly assessed to determine whether they are unnecessarily inhibiting the ability of pension fund asset managers to implement optimum investment strategies and amended to the extent necessary.

In general the guidelines recommend to use quantitative limits sparingly, and to combine them with a move towards a prudent person rule where possible. The main drawback of quantitative limits is that they do not pay attention to the contribution of any specific security or asset class to the overall risk in the pension fund's portfolio. They can also be difficult to change and adapt to new market environments, especially when the limits are set in the primary legislation. When limits are set at very low levels they may hamper diversification, performance and even asset liability management, as some asset classes may offer a better match to a pension fund's liabilities.

Moreover, quantitative limits alone are not sufficient as they cannot effectively regulate the manner in which pension fund asset management decisions are made within the boundaries of different asset classes and, in fact, are silent with respect to activity that is "within bounds." Therefore countries that rely primarily on portfolio limits should, at a minimum, also set forth prudent person standards for pension fund governing bodies. The debate between quantitative limits and the prudent person rule ultimately comes down to the following question: who should be responsible for making the initial, broad determination of an asset allocation policy for a pension fund – the state or the each fund's trustees?

There is much evidence on the potentially damaging effects of strict portfolio limits on diversification and performance. Most of it is based on historical data which raises concerns over the validity of the counterfactual. However, the impact is so large in some cases as to warrant concern over the impact of such limits. The recommendation is also likely to vary by country. The gains from international diversification are greatest in small, developing countries, and smallest in large, developed ones. A recent paper by Burtless (2006) concludes that workers in the United States could have earned higher pension benefits from portfolio diversification that included overseas stocks and bonds but that the risk of obtaining a very low pension replacement rate would have also increased. The main reason for this result is that historical returns in most overseas markets have been lower than those in the United States. On the other hand, Srinivas and Yermo (2002) conclude that Latin American pension fund investment (up to half the equity portfolio in some cases) in foreign equity indices of developed countries would have not only improved returns but also lowered risk.

2.2 Quantitative limits in OECD and non-OECD countries

The OECD guidelines give details of the quantitative restrictions which are still applied in OECD countries. Over one half of OECD countries still impose some type of portfolio limit by asset class. For example, equity limits are applied by eighteen of the thirty OECD countries. The highest limit is Turkey's, at 76%, while the lowest is Mexico at 15% (only through structured notes linked to stock market indices). Some countries also still set investment floors, though these are not recommended by the OECD Guidelines. For example, Mexican mandatory pension funds with a conservative investment allocation (so-called Fund 1) must invest at least 51 percent of their assets in inflation-indexed securities. In Turkey, pension funds must invest at least 24 percent of contributions in government bonds.

Many countries also impose restrictions on foreign investment or/and impose currency matching requirements. Countries that restrict investment in securities issued abroad or issued in foreign currency include Korea and Mexico (20 percent), Slovak Republic (70 percent), and Poland (5 percent). Finland sets

a limit of 10 percent on investment outside the European Economic Area, while a few other countries impose restrictions on investment outside the OECD (Hungary - 20 percent -, Italy – 5 percent -, the Czech Republic and Iceland – 0 percent).

Among the countries with a prudent person rule tradition (primarily Anglo-Saxon countries), some also have also elected to use at least one type of quantitative limitation to address conflicts of interest. This is true, for instance, in both the United Kingdom and the United States, which are both typically thought of as wholly adopting a prudent person rule method of regulation. Equally some countries in which quantitative limits serve as the core method of regulation also use the prudent person rule – or some similar form of behaviourally-oriented guidance – in addition to the quantitative limitations, thus providing guidance regarding the manner in which investments within each asset class should be made. Evidence of such a mixed approach can be found in some OECD countries (such as Poland). Interestingly the European Union have adopted a hybrid approach via their directive on 'Institutions for Occupational Retirement Provision' (IORPs). This enables countries to retain quantitative limitations for domestic pension funds within their borders, and provides a broad, prudent person rule for pan-European funds (with some quantitative restrictions – i.e. limit of 5% in one single company, 30% in unregulated markets and 30% in assets outside the Euro zone).

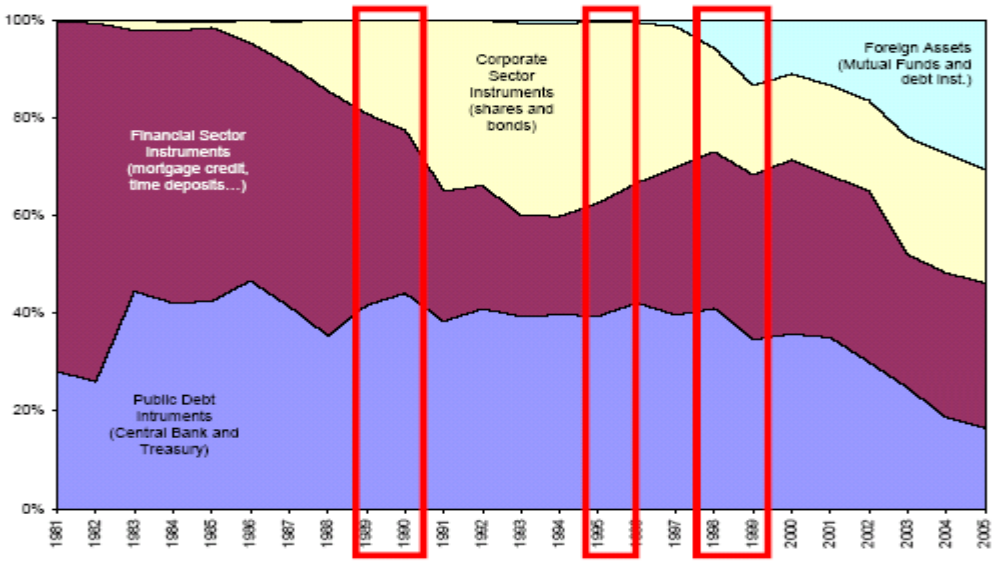
Many OECD countries have relaxed or altogether moved away from quantitative restrictions. Canada eliminated its 30 percent cap on foreign investment in February 2005. In Germany, while restrictions remain for the *Pensionskassen*, a new type of financing entity, the *Pensionsfonds*, was introduced in 2002 which is not subject to any quantitative restrictions on investment by asset class other than currency matching requirements and a 5 percent limit on investment in a single issuer (including the plan sponsor). In Japan, pension funds were subject to the so-called 5-3-3-2 rule (a floor of 50 percent on cash and bonds, a ceiling of 30 percent on equities, a ceiling of 30 percent on foreign securities, and a ceiling of 20 percent on real estate) until April 1999, when the rule was eliminated and regulation veered towards the prudent person principle. New regulations introduced in Korea in September 2003 eliminated the 40 percent limit on domestic listed equities, introduced a ceiling of 10 percent for non-listed equities (not permitted previously) and lifted the foreign investment ceiling from 10 to 20 percent. Mexico changed its investment regulatory framework in 2002. Pension funds were permitted to invest in securities denominated in foreign currency by any local issuer (not just the Mexican government and central bank). In Switzerland, pension funds face quantitative limitations on their investment in equities and foreign securities but since April 2000 these can be surpassed if the fund can justify them as part of a prudent investment policy.

In all these countries, the relaxation of asset limits and the concomitant move towards the PPR is being complemented with efforts to strengthen governance as well as enhanced risk management models to assess portfolio risks. For example, in Mexico, the reform of investment regulations in 2002 was accompanied with the establishment of a new system of supervision based on value-at-risk.

In emerging market economies (EMEs) the QAR approach has been traditionally dominant. For example, in the eight EME countries surveyed by the latest OECD Survey of Investment Regulation of Pension Funds (OECD 2007b), seven countries have implemented the QAR approach, while the only exception is Israel. In Brazil the existing regulation specifies that maximum 50% of pension assets can be invested in companies with a good governance rating, and up to 20% can be invested in private equities. In South Africa, the upper limit on investment in real estate is 25%, while investment in retail and private investment funds is not allowed.

However, in many EMEs pension fund investment regulations have been gradually liberalised, and such a move from a strict QAR to a more liberalised investment approach on part reflects improved experience and capability of pension regulators, and also the pressure to enhance pension fund performance by seeking a more diversified portfolio. Larrain Rios (2007) provided evidence on the Latin American

countries, supporting this trend. For example, pension funds were initially not allowed to be invested in foreign assets in Argentina, Bolivia, Colombia and Peru. However, since inception of reforms such restriction has been relaxed in early 2000s. Consistent with such trend, Chilean pension fund portfolios have been becoming more diversified on the one hand, and witnessed more allocation to high-return-high-risk assets on the other hand, as shown in the following graph.



Source: Larrain Rios (2007)

For example at the beginning stage of the Chilean pension reform all assets virtually were invested in government bonds and bank deposits. Over the past 25 years, following relaxation of pension fund investment regulations, allocation to these two traditional asset classes was in steady decline, while investments in corporate bonds and foreign assets were in increase.

2.3 Quantitative Limits within a risk-based approach to pension supervision

Some countries which still rely heavily on quantitative limits have integrated these into a risk-based approach to supervision. The supervisory authority consequently monitors investment risk according to whether pension funds are invested within the quantitative limits set. Non-compliance will be added to the overall risk score within the risk assessment part of risk-based supervision process. For example in Kenya the Retirement Benefits Agency still applies a broad range of investment guidelines to pension funds including: maximum 5% in cash, maximum 70% in government securities, maximum 70% in regionally listed shares, maximum 5% in unquoted Kenyan companies, maximum 30% in one company etc. The rule that these maximum limits may be violated in cases of asset revaluation or appreciation for a period of no more than 90 days is also applied. The authority is, however, moving towards as risk-based approach to supervision and builds these limits into its overall risk assessment. The degree of diversification of a fund's investment portfolio and compliance with the investment guidelines count for 5% of the overall risk score - 2 marks are awarded if the scheme has complied with investment guidelines / 1 mark if invested in guaranteed funds (some penalization to take account of credit risk in such an investment instrument) and 0 for non-compliance. The Retirement Benefits Authority also considers investment income within its on-site inspection guidelines (e.g. recommending consideration of the volatility and distribution of income by asset class).

3. Prudent Person Rule

3.1 OECD Recommendation on the Prudent Person Standard

The OECD 'Guidelines on Pension Fund Asset Management' also lay out recommendations for the use of the prudent person standard. This application of this standard is defined as "*that the investment of pension assets is undertaken with care, the skill of an expert, prudence and due diligence."* The guidelines clarify that the standard applies to the governing body of the pension fund and other appropriate parties, and that it forms part of the fiduciary duty of the governing body (i.e. the duty of loyalty where by fiduciaries must act in the interests of the pension plan members and beneficiaries). The guidelines state that where fiduciaries lack the necessary expertise to apply the prudent person rule their duties should be outsourced, although their monitoring role and ultimate responsibility for the plan cannot be transferred.

Using the prudent person rule to monitor investment risk indirectly is more difficult than solely applying quantitative limits, as the standard is qualitative and therefore subjective in nature. The main application of the prudent person rule comes via behaviour and process rather than outcome. The OECD guidelines therefore state that 'due diligence' in the investment process be shown via an investment policy and internal controls for implementing and monitoring the investment process effectively. For example the investment process of a pension plan should be written, with clear investment objective suitable for the fund (i.e. taking into account the liabilities and risk tolerance of the fund, liquidity needs etc.) – as well as suitable diversification applied. The pension supervisory authority needs to watch that such mechanisms for monitoring and control are in place, rather than looking solely at investment outcomes.

3.2 Practical Experience of the Prudent Person Standard

Interpretations of the prudent person rule

Given the subjective nature of the standard, the application of the prudent person rule has changed over time and differs across OECD countries. For example, historically the prudent person rule was oriented towards the avoidance of risk and the analysis of investment decisions were reviewed by courts on an investment-by-investment basis. The old English rule, which was designed to protect beneficiaries from speculative investments, provided that the only safe (and thus prudent) investment was in government-backed securities, the sole obligation of a trustee being the conservation of principal. This interpretation was radically changed by a court case in 19th America ('*Harvard College v. Amory'*) which departed from this narrow rule (allowing for investment in stocks) by applying a process-orientated approach and duty of loyalty and rejecting inappropriate specific limitations. However the emphasis was still on income, safety and the avoidance of speculation – which allowed a conservative interpretation of the prudent person rule to last well into the 20th century (in both the USA and UK), until modern portfolio theory and financial economics became accepted – allowing risk to be considered at the portfolio rather than individual asset level.

Similarly, details of prudent person standard vary between OECD countries. For instance, the US incorporates a "prudent expert" standard in its pension laws, whereas the UK uses an "ordinary man of business" standard. Likewise, some countries will more explicitly state various aspects of the rule than others. For example, the UK explicitly requires fiduciaries to develop a statement of investment policy to guide investment decision making. In the US, however, there is no explicit rule on this point.

It can be seen that the concept of risk and risk management has varied considerably over time and place – the prudent person rule provides the flexibility to adapt to such changes. The downside is that because the rule can be interpreted in a flexible manner it is not always easy to determine when it has been breached. This places more demands on fiduciaries and supervisors. The courts have also played a central role in

common law countries in refining the definition of the prudent person standard and in determining whether it was breached in any specific case.

International evidence for successful application of the prudent person rule

Although tentative conclusions from studies have found that the prudent person rule allows higher investment returns than quantitative limits, empirical data also suggests that pension funds subject to prudent person principles do invest cautiously (e.g. all else being equal, pension funds invest more cautiously than mutual funds). Indeed the rule may have a constraining effect on management behaviour (i.e. encouraging indexing and herding, preventing investment in new products etc.), as the simple way to interpret the standard is according to past behaviour or by what everyone else is doing.

The question therefore remains as to how to ensure that the prudent person rule is implemented successfully. The following points provide some guide:

- Regulatory role – make sure the regulatory environment does not discourage new investment instruments / practices (e.g. US DOL clarified the role and management of derivatives in pension portfolios)
- Supervisory role – make sure the supervisory authority and plan members can monitor investment management activity via the supply of adequate information
- Governance framework – supervisory authorities should ensure that the governance framework of pension funds is sufficiently robust to produce appropriate decision making (e.g. requiring an investment policy to be written etc.).
- Sanctions framework: the weight of sanctions needs to be carefully balanced (not so strict as to stop innovation / not so weak as to allow reckless investment)

3.3 Prudent Person Standard within a risk-based approach to pension supervision

Checking that pension funds are in compliance with these qualitative, more subjective rules is more difficult than applying quantitative limits. However, supervisory authorities are incorporating such assessments into their risk-based supervisory approaches. One example of this approach is Australia[2]

The Australian Prudential Regulatory Authority (APRA) supervises all financial institutions, including pension funds, and applies a sophisticated risk-based supervision system for pension funds. Their approach to assessing investment risk is outlined below. Documents used by APRA in assessing investment risk include balance sheet data, including statistics submitted quarterly (by large funds) and annually; cash flow statements and projections; investment mandates for external managers; investment manager reports; tender and evaluation documents relating to manager selection; and regular reports to the trustees. This assessment is then fed into the PAIRS rating system (Probability and Impact Rating System) which determines the approach of the supervisory authority. A fund receiving a 'very low' PAIRS rating on inherent balance sheet/investment risk will have well-diversified investments spread across different investment products and markets, and no exposure to volatility in returns. At the other end of the spectrum, a fund rated 'extreme risk' on this criterion will have a concentration of investments in one product or market, and high exposure to volatility. In between, a high-medium rating (1.6 to 2.0) is aligned with

[2] The description of APRA's application of the prudent person rule to its risk-based approach to supervision is taken from a report prepared for a World Bank/ IOPS project looking a approaches to risk-based supervision within various countries: 'Risk-based supervision and regulation of pension funds: Case study Australia'

'some concentration' of investments in certain products or markets, and 'significant exposure' to investment volatility.

In order to derive this rating, APRA does not apply quantitative restrictions[3]. Instead APRA's supervisory approach is to determine whether a fund has a clear investment strategy; to assess whether that strategy is consistent with the trustee obligations; to make a judgment on whether the trustees, with service providers where relevant, are competent to carry out that strategy; and to assess whether they are capable of monitoring the strategy's implementation and adapting it to changed circumstances for either the fund or for markets.

4. Pension fund investment in China

Pension reforms in China where first introduced in urban areas, and have been subject to continuous amendments over the past decades. Table 1 gives the latest specification of the urban pension system. Pillar one comprises two components, i.e. 1A and 1B. Pillar 1A runs on a PAYG basis. The contribution is 20% of wages and wholly from enterprises. The target replacement rate is 35%. Pillar 1B, managed as individual accounts, is financed by an 8% contribution from individuals. With a target replacement rate of 24.2%, the monthly payout from pillar 1B is calculated by dividing the account balance by 120 then multiplied by an annuity factor. Both components are mandatory, and the collective target replacement rate is 59.2%, i.e. 35% from pillar 1A and 24.2% from pillar 1B. Pillar 2 – termed as Enterprise Annuities (EA), is equivalent to the occupational pension plans in the western countries. Contributions to this pillar are voluntary and currently the EA plans are mainly set up by the largest, profitable State-owned enterprises (SOEs). The last pillar, i.e. personal plans, is currently underdeveloped in China.

Table 1 The structure of the urban pension system in China, as of 2006

Pillar	Contribution rate %	Target replacement rate %	PAYG/funded	Mandatory/ voluntary	Status
1A	Enterprise:20 Individual:0	35	PAYG	Mandatory	In operation
1B	Enterprise:0 Individual:8	24.2	Funded*	Mandatory	In operation
2	Enterprise: N.A. Individual: N.A.	N.A.	Funded	Voluntary	In operation
3	Individual: N.A.	N.A.	Funded	Voluntary	Not finalized

Source: OECD (2007c) *, fully funded in principle, but in practice run on a PAYG basis.

Latest statistics from MOLSS show that as of 2006 the accumulated assets within Pillars 1A and 1B were RMB 548.9 billion (USD 73.6 billion), and as of September 2007 the total amount of EA assets was approximately RMB 120 billion (USD 16.1 billion). Although funded pension assets are still small, it is expected that they will increase rapidly in the near future for the following reasons. First, since early 2006 the Chinese government has been seriously working on the issue of "empty pillar 1B", and decided to "back-fill" this account in 11 provinces via fiscal transfer from both central and local governments; potentially this reform for making the empty accounts fully funded will be extended to all the other provinces. Second, a number of legislations have been released in recent years, with the aim of promoting

[3] The only restrictions applied are on 'in house assets' (that is, investments in an employer-sponsor and related entities), the sole purpose test (investments must be for the purpose of delivering retirement income) and prohibitions on lending to members.

development of the EA market. It has been forecasted that the overall EA assets in China could grow to the level of USD 1.8 trillion by 2030 (World Bank 2006).

Despite the promising market expansion of funded pension assets in China, the current investment legislations, outlined below, might be counter-productive to achieving a return which is sufficient enough to support retirees' post-retirement lives:

- Pillar 1B: As state pensions and with the aim of providing pensioners with the basic needs, all assets within this category are only allowed to be invested in bank deposits and government bonds
- Pillar 2: As voluntary occupational pensions, assets of this pillar were mainly invested in bank deposits and government bonds like Pillar 1B, although some portion of the funds were directed to other asset classes, e.g. shares and insurance products. Since 2004, however, EA markets have entered a new era, following the release of two EA legislations. According to the two legislations, EA assets are subject to quantitative asset restrictions, e.g. maximum 30% of assets can be invested in shares and shares-like products, and minimum 20% of assets should be invested in government bonds.

5. Benefits of pension fund investment liberalisation in China

In earlier sections the positive benefits from liberalising a strict investment regime and applying the prudent peson rule in both OECD countries and emerging market economies has been demonstrated, and the OECD Guidelines on Pension Fund Asset Management outlined. In this section a simple empirical study (Davis 2002) was carried out to show the quantitative beneficial impacts on pension fund returns if a more liberalised pension fund regulation were available in China. The analysis was conducted for both Pillars 1B and 2, in order to investigate whether such impacts are applicable to both pillars.

5.1 Beneficial impact of pension fund liberalisation for Pillar 1B in China

Table 2 gives asset returns and standard deviations relating to four hypothetical pension portfolios of Pillar 1B assets in China. Hypothetical portfolios are used in that, to the best knowledge of the authors, actual pension asset compositions in China are not available. In our empirical analysis, the basic portfolio consists of two asset classes, i.e. bonds and bank deposits, in light of the current legislations on Pillar 1B restricting investments to these asset classes. Meanwhile, it is assumed that the pension assets were equally allocated to the two asset classes, i.e. 50% in government bonds and 50% in bank deposits. Given this specification, asset returns in real terms were in the range between -1.5% in 2005 and 5.0% in 1997. On average the real return of the basic portfolio was 1.7% between 1993-2006, and 2.1% between 1993-2004. Data relating to the period from 1993 to 2004 were also calculated, in view of the concern that returns on domestic shares in 2005 and 2006 introduced potential abnormalities, and were therefore excluded. The corresponding standard deviations were 1.8% and 1.7%, respectively. In addition, the Sharpe ratio was also calculated, which is used to measure the reward to risk, i.e. to what extent extra returns are achieved in order to compensate for additional risk. Note that when calculating Sharpe ratios, the standard formula is (return on portfolio – return on risk free asset) / portfolio risk. In our analysis given that all returns are in real terms, it is assumed that return on risk free assets (in real terms) is zero, therefore the above formula is reduced to be return on portfolio / portfolio risk. As regards the basic portfolio the Sharpe ratio was 0.94 (Panel 1) and 1.20 (Panel 2), respectively.

In addition to the basic portfolio, four variant portfolios were analysed in order to investigate the quantitative effects of shifting from a QAR approach to a more liberalised regulatory regime, particularly in terms of investment overseas. Variant 1 relates to the "naive" investment strategy, where domestic shares, government bonds and bank deposits consist of one third of the total assets each. The "naive" investment strategy is selected as research shows that this strategy produces as high a return as active

investment strategies (Bateman and Thorp 2007). Results in Table 2 show that returns of the hypothetical Variant 1 portfolio vary markedly over the observation period. For example, in 1994 the return in real terms was -10.4%, while in 2006 it was 51.3%. During the whole period the mean return was 8.3%, standard deviation was 16.4%, giving a Sharpe ratio of 0.50. If the data for 2005 and 2006 were excluded the mean return was 4.0%, standard deviation 11.1%, while the Sharpe ratio was 0.36. As shown, the mean return of Variant 1 (a more liberalised hypothetical domestic portfolio) was higher than that of the basic portfolio. It is, however, also noted that standard deviation (i.e. corresponding risk) increased from 1.8% to 16.4%, thus ultimately leading to a lower Sharpe ratio.

Besides the above-mentioned more diversified domestic portfolio, three hypothetical portfolios with international investments were also analysed. We considered three scenarios, i.e. Variant-2: 70% in domestic assets (of which it was assumed that 50% in domestic shares and 50% in domestic government bonds), and 30% in foreign assets (of which it was again assumed that 50% in foreign shares and 50% in foreign government bonds), Variant-3: 50% in domestic assets and 50% in foreign assets, and Variant-4: 30% in domestic assets and 70% in foreign assets. Again all returns are in real terms, i.e. inflation was considered, while returns on foreign assets also allowed for foreign exchange risk. Empirical results relating to the three portfolios are given in Table 2. As regards Panel 1, the mean return was 3.7%, 5.0%, and 6.3%, respectively, while standard deviation was 4.8%, 7.4% and 10.1%. The corresponding Sharpe ratio was in the range between 0.62 and 0.76, smaller than that of the basic portfolio, but greater than that of Variant-1. The same indicators were also calculated by excluding observations of 2005 and 2006. Results are similar as those of Panel 1.

By looking at results relating to the basic portfolio and the four variants, the beneficial impact of liberalising asset restrictions of Pillar 1B can be indicated. Variant-1 consistently shows superior returns, but also much higher risks, thus lowest Sharpe ratios. In comparison the performance of the three variant portfolios with foreign investments achieved a balance between return and risk, i.e. a good overall return with relatively low risk. This is also demonstrated by the value of Sharpe ratios. Benefits of foreign investments were further proved if data of 2005 and 2006 were excluded. As shown in Panel 2, variants 2, 3 and 4 often outperformed variant-1, and also the basic portfolio by a significant margin. It is noted that the basic portfolio always achieved the highest Sharpe ratio. However, the return was too low to be sustainable in the long run, i.e. the investment strategy is too conservative.

Table 2 Quantitative effects of moving towards more liberalised portfolios for Pillar 1B assets in China

	Domestic	**Investment Liberalisation**			
	0-50-50	**33-33-33**	**70-30**	**50-50**	**30-70**
	Basic portfolio	Variant-1	Variant-2	Variant-3	Variant-4
1993	3.4	2.2	17.4	26.7	36.1
1994	3.4	-10.4	3.8	4.1	4.4
1995	4.5	1.6	5.3	5.9	6.4
1996	1.6	10.6	3.2	4.2	5.2
1997	5	-14.2	6.4	7.4	8.3
1998	2.7	7.6	5	6.4	7.9
1999	1.5	5.9	-0.1	-1.1	-2.2
2000	0.6	7.3	-3.1	-5.5	-7.9
2001	0.4	-0.5	-1.2	-2.2	-3.3
2002	0.5	30.6	5.8	9.3	12.8
2003	0.9	4.1	3.9	5.9	7.9
2004	0.1	2.9	0.9	1.4	1.9

2005	-1.5	16.6	1.6	3.7	5.8
2006	1.2	51.3	2.5	3.4	4.2
1993-2006					
Mean	1.7	8.3	3.7	5	6.3
Standard deviation	1.8	16.4	4.8	7.4	10.1
Sharpe ratio	0.94	0.5	0.76	0.67	0.62
1993-2004					
Mean	2.1	4	3.9	5.2	6.5
Standard deviation	1.7	11.1	5.2	8.1	11
Sharpe ratio	1.2	0.36	0.76	0.65	0.59

Source: Figures were calculated by the authors. All data are from Datastream, expect for China government bond yields which were obtained from the Chinabond website.

1. Domestic: the three digits refer to percentage of assets invested in domestic shares, government bonds and bank deposits, respectively;
2. Investment liberalisation: the three digits refer to the same as the above, while the two digits refer to percentage of assets invested in domestic and foreign portfolios, respectively; the domestic portfolio refers to the basic portfolio (i.e. 0-50-50), while the foreign portfolio refers to the one consisting of 50% in foreign government bonds and 50% in foreign shares.
3. All returns are in real terms. Foreign exchange risks are allowed for returns on foreign investments.
4. Panel 2 is calculated in order to see how the results change by excluding the extreme values of returns on domestic shares observed for 2005 and 2006.
5. Sharpe ratio is calculated by dividing mean by standard deviation, and it is assumed that returns on risk-free assets are zero in real terms

5.2 Beneficial effects of pension fund liberalisation for EA plans in China

In this section we will look at the quantitative effects if the EA asset investment were subject to a more liberalised regulatory regime. Empirical results are given in Table 3. The basic portfolio is constructed in a way which mimics the practical asset allocation of the EA plans. As noted earlier, EA plans in China were mainly invested in government bonds and bank deposits prior to 2004. Afterwards investments have been subject to regulation of the No 23 document released in 2004, which is, however, still a QAR approach. Taking into account these developments, it is assumed that the basic portfolio in 2004 and afterwards invested 30% in domestic shares, 50% in domestic government bonds and 20% in bank deposits. Given this specification the mean return over 1993-2006 was 6.3%, standard deviation 12.1%, and Sharpe ratio 0.52. The three figures were 2.3%, 1.6% and 1.43, respectively, taking the observation period 1993-2004. Meanwhile, it is noted that in 2005 and 2006 the return was quite high, i.e. 14.9% and 46.4%, respectively, which was mainly due to 30% of asset allocation to shares.

Like the empirical work of Pillar 1B four variant portfolios were considered in order to see the extent to which results are changed. Variant-1 refers to a domestic "naive" portfolio, of which 33% invested in shares, 33% in government bonds, and 33% in bank deposits. During the whole observation period the return was lowest at -14.2% (in 1998) and highest at 51.3% (in 2006); the average return was 8.3%, standard deviation 16.4%, and the resultant Sharpe ratio 0.50. The results under Panel 2 show the same picture, i.e. an increased mean return and standard deviation and lower Sharpe ratio when compared to the basic portfolio. In addition, we calculated the same statistics for another three portfolios with assets invested abroad. For example, for variant-2, i.e. 70% invested domestically and 30% invested abroad, the lowest portfolio return was observed at the level of -3.1% in 2000, and the highest return was 34.2% in 2006. On average the mean return was 6.9%, standard deviation 9.5%, and Sharpe ratio 0.73. For the other

two variants the mean return was gradually increased with more assets invested abroad. Again given the concern that high values of return on domestic shares in 2005 and 2006 might distort our results, investment statistics were re-computed by excluding data relating to the two years. Results indicated as Panel 2, are shown in Table 3. All four variant portfolios outperformed the basic portfolio in terms of portfolio return, while the opposite was observed in terms of portfolio risk. As regards the four variants, the last three portfolios outperformed the basic portfolio in terms of the all three statistics, i.e. mean return, standard deviation and Sharpe ratio.

Above we present empirical results relating to the basic portfolio of the EA pension plans, as well as the four variant portfolios. It is shown that return on the basic portfolio was lower than that of the other portfolios, thus indicating the potential benefits of the prudent person rule approach. For example, as regards Panel 1 the mean return was 6.3% for the basic portfolio, while it was in the range of 6.9% and 8.3% for the other portfolios. Such beneficial impact of liberalising pension investment for the EA plans were more obvious if the observation period relates to 1993-2004, since return on the basic portfolio was reduced to be 2.3% (from 6.3% in Panel 1), which was mainly due to the fact of no assets invested in shares in Panel 2. If risk is taken into account, performance of the three foreign portfolios was more satisfactory, and that of the "naive" portfolio was less promising in comparison to the basic portfolio, as indicated by the value of Sharpe ratios.

Table 3 Quantitative effects of moving towards more liberalised portfolios for EA assets in China

	Domestic	**Investment liberalisation**			
	0-50-50/30-50-20*	**33-33-33**	**70-30**	**50-50**	**30-70**
	Basic portfolio	Variant-1	Variant-2	Variant-3	Variant-4
1993	3.4	2.2	17.4	26.7	36.1
1994	3.4	-10.4	3.8	4.1	4.4
1995	4.5	1.6	5.3	5.9	6.4
1996	1.6	10.6	3.2	4.2	5.2
1997	5.0	-14.2	6.4	7.4	8.3
1998	2.7	7.6	5.0	6.4	7.9
1999	1.5	5.9	-0.1	-1.1	-2.2
2000	0.6	7.3	-3.1	-5.5	-7.9
2001	0.4	-0.5	-1.2	-2.2	-3.3
2002	0.5	30.6	5.8	9.3	12.8
2003	0.9	4.1	3.9	5.9	7.9
2004	2.9	2.9	2.9	2.8	2.8
2005	14.9	16.6	13.1	11.9	10.7
2006	46.4	51.3	34.2	26.0	17.8
1993-2006					
Mean	6.3	8.3	6.9	7.3	7.6
Standard deviation	12.1	16.4	9.5	9.3	10.6
Sharpe ratio	0.52	0.50	0.73	0.78	0.72
1993-2004					
Mean	2.3	4.0	4.1	5.3	6.5
Standard deviation	1.6	11.1	5.1	8.0	11.0
Sharpe ratio	1.43	0.36	0.80	0.66	0.60

Key: see Table 2; *, 0-50-50 refers to portfolio allocation prior to 2004, while 30-50-20 refers to that afterwards.

5.3 In summary

In this section a simple empirical study was conducted to demonstrate the quantitative effects of liberalising existing pension fund investment restrictions relating to both Pillar 1B and Pillar 2 towards a less restricted approach, e.g. prudent person rule. Based on results of the basic portfolio and four comparative pension portfolios, the beneficial impacts were observed. In other words, returns on the basic portfolio (which intends to mimic the actual pension portfolios in China) were consistently lower, and much lower in some cases, than those on the more diversified portfolios. This result was robust even if two different observation periods were used. When risk is taken into account, the standardised return or Sharpe ratio was highest for the basic portfolio, which, however, corresponds to a very low portfolio return, typically around 2% - a level we believe to be too low to be sustainable in the long run. In contrast, the Variant-1 portfolio always resulted in the lowest Sharpe ratio, which was mainly due to the associated higher risk, despite high returns. For the other three variant portfolios a good balance between return and risk was achieved. For example, for Pillar 1B portfolio return for the three portfolios was between 3% to 7%, while Sharpe ratio was around 0.6 and 0.8, depending on proportion of assets invested abroad and observation period used. For the EA plans, the portfolio return was between 4% to 8%, while the corresponding Sharpe ratio ranged between 0.6 and 0.8.

Given the above-mentioned empirical evidence and experiences from both OECD and non-OECD countries discussed in the earlier sections, it is likely that the existing pension investment regulation in China has forced pension assets to be invested in an overly conservative manner, which has the implication of lowering portfolio returns for a given risk, therefore potentially leading to a lower benefit for retirees when they start drawing monies from their individual accounts. Therefore, for the sake of protecting and maximising the interests of plan members (which is becoming increasingly important given that both the mandatory, individual accounts and EA plans have been designed to be fully funded in China, and thus all risks are borne by individuals), and with consideration of the second-order benefits, (e.g. promoting development of funded pension markets), current pension investment could be gradually liberalised towards the international best practices, e.g. in line with the prudent person rule.

6. Conclusion

Pension fund assets in OECD countries have increased rapidly over the past decades (OECD 2007a), and it is evident that such trend will continue. Against this background how to invest such a large amount of assets has become an important issue, which also has policy implications. Broadly speaking pension funds in the globe have been subject to two approaches, i.e. quantitative asset restriction (QAR) and prudent person rule (PPR). The OECD Guidelines on Pension Fund Asset Management released in 2005 acknowledge the rationale of implementing quantitative portfolio limits (particularly if it is on a temporary manner), but recommend that quantitative limits should be used sparingly, and combine them with and move towards the PPR where possible.

International experiences show that in Anglo-Saxon countries, e.g. the United Kingdom and the United States, the PPR approach is more popular, while in the other OECD countries and many EMEs, the QAR approach has dominated. However, it is also equally observed that there is no “pure” PPR-implementing country. For example, even in the United Kingdom and the United States there are limits on self-investment. Meanwhile, pension fund regulation is an ongoing process, in that asset restriction has been gradually eased in both OECD and non-OECD countries. Typically high-risk assets, e.g. equity, foreign assets were not initially allowed, but relaxed later on.

In China funded pension funds exist in two forms, i.e. Pillar 1B (personal account) and Pillar 2 (EA account). The current pension fund investment legislation specifies that all assets in Pillar 1B are invested in government bonds and bank deposits, while those in Pillar 2 are also subject to the QAR approach, albeit to a lesser extent in comparison to Pillar 1B. In this paper we conducted an empirical study, quantitatively showing the beneficial impacts of allowing more diversified portfolios for both Pillar 1B and Pillar 2. Given international experiences and empirical results, it is believed that the current pension regulations in China are likely to hamper investment diversification and portfolio performance in the long term, which could potentially hurt the interests of plan members, a particularly important issue given the long investment horizon of pension funds and the transfer of risk to individuals given the design of the pension system.

In light of experiences from both OECD and non-OECD countries as reviewed in this paper, as well as the empirical results, current Chinese pension fund investment regulations could consider the following reform options in order to strengthen the system:
For Mandatory Individual Accounts:

- Removing lower limits on government bonds and bank deposits
- Allowing investment in more asset classes (e.g. shares and real estate)
- Gradually allowing for pension assets to be invested abroad

For Enterprise Annuities:

- Removing lower limits on certain asset classes, e.g. government bonds and bank deposits
- Combining the quantitative limits with a move to a prudent person rule where possible
- Gradually allowing for pension assets to be invested abroad

Moving from the QAR to the PPR approach, however, gives pension regulators a more difficult task in monitoring investment risk. Therefore, it is advisable that such regulatory relaxation should be matched by a corresponding strengthening of regulatory capability. In this regard, a well-functioning regulatory framework, including the development of appropriate risk monitoring measures is needed.

Meanwhile, some financial preconditions are also needed in order to reap the beneficial impact of pension reform towards funding in general and in particular to justify a more liberalised investment regulatory regime. In China it has been argued (Hu 2006b) that the basic conditions necessary for pension reform for funded pillars, e.g. a relatively sound banking sector, rudimentary stock market and basic accounting standards are available; however, the current capital markets are still associated with many problems which might justify the current quantitative restriction approach implemented by the Chinese authorities, e.g. high volatility of the stock market, speculative mood among both individual and institutional investors, insufficient investor protection, etc. However, with the expected improvement in market conditions, greater maturity of the capital markets and more experienced financial regulators, in the long run the Chinese legislations on pension fund investment may be gradually relaxed. This will allow the system to reap the rewards indicated by our empirical results and would also be consistent with the practices observed in OECD and non-OECD countries.

References

Bateman, H. and Thorp, S. (2007), "Decentralised investment management: an analysis of non-profit pension funds", *Journal of Pension Economics and Finance*, 6, p21-44.

Burtless, G. (2006), Risk and Reward of International Investing for Retirement Savers: Historical Evidence, paper prepared for the 8th Annual Joint Conference of the Retirement Research Consortium "Pathways to a Secure Retirement" August 10-11, 2006, Washington, D.C.

Clark, G. L. and Hu, Y (2005). "Re-writing pension fund capitalism 2: the UK pension crisis and trends in occupational pension plan benefits, 1950-2004", WPG 0509, The University of Oxford, England

Davis E P (2002), "Prudent person rules or quantitative restrictions? The regulation of long term institutional investors' portfolios", *Journal of Pension Economics and Finance*, 1, 157-191

Hu, Y (2006a). "The impact of pension funds on financial markets", in *Financial Market Trend* No. 91, OECD, Paris

Hu, Y (2006b). "China's Pension Reform: A Precondition Approach", *Global Economic Review*, 35 (4), pp413-424

Larrain Rios, G. (2007). Portfolio Investment in an Intertemporal Setting: Assessment of the Literature and Policy Implications for Latin American Pension Systems, in *OECD Working Papers on Insurance and Private Pensions* No. 10, OECD Publishing, OECD, Paris

OECD (2007a). Pension Market in Focus Newsletter, Issue 4, forthcoming, OECD, Paris.

OECD (2007b). Survey of investment regulations of pension funds, July, OECD, Paris.

OECD (2007c). Pension System Country Review: China, OECD, Paris.

Sharpe, William F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk, Journal of Finance, 19 (3), 425-442.

Srinivas, P. S. and Yermo, J. (2002), Risk Management through International Diversification: The Case of Latin American Pension Funds, in Zvi Bodie, Brett Hammond, Olivia S. Mitchell, and Steve Zeldes (ed.) "Innovations in Managing the Financial Risks of Retirement", 2002.