An EDHEC-Risk Institute Publication

Investment Solutions for East Asia's Pension Savings

Financing lifecycle deficits today and tomorrow

May 2013

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EDHEC-RISK Institute

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The authors would like to thank Dominique Forget, Jean-Pierre Leoni, Erwan Boscher, Akiko Nomura, Yu-Ying Kuo, Masaaki Ono, Stuart Leckie, Rita Xiao, Natalie Gallery, Wilson Sy, Kevin Liu, Olivia Mitchell, Michael Drew, Heikki Oksanen, Josef Pilger, James Lin, Frédéric Ducoulombier and Noël Amenc for useful comments and suggestions. Financial support from AXA-IM is acknowledged. This study presents the author's views and conclusions which are not necessarily those of AXA-IM. Printed in Singapore, May 2013.

Foreword

The purpose of this publication, which is drawn from the AXA Investment Managers research chair at EDHEC-Risk Institute on "Regulation and Institutional Investment", is to examine the role of pension systems in the financing of current and future standards of living in Asia's ageing nations and to study the potential contribution of scientific asset management to the challenges faced by the region's pension reserve funds and funded pension schemes.

The five jurisdictions reviewed in this study - Hong Kong, Japan, Korea, Mainland China and Taiwan - have important common traits impacting the state and health of pension systems: their populations are ageing at a uniquely rapid pace, and their economic development trajectory is characterised by equally rapid change and significant financial and economic imbalances.

The stakes are high for the populations of East Asia, since current trends may lead to a significant rise in poverty for the next generation, or to public liabilities on a very large scale, or both.

In this context, we highlight an important conundrum: while East Asia's households save considerably more than in the rest of the world, only a limited amount of these savings has so far made its way into dedicated investment solutions designed to protect consumption levels post-retirement.

Averting East Asia's pension crisis is thus possible if the region's vast savings can be used adequately to finance future consumption needs.

This requires understanding the demographic process that creates explicit and implicit liabilities, for each household and entire nations, across several generations. It also requires addressing the risks of structural imbalances and the impact of a potential re-balancing of East Asian economies. Finally, regulation needs to help channel the region's savings into adequate retirement solutions.

This publication examines these issues for pension reserve funds, defined-benefit and defined-contribution plans. It proposes a perspective on the region's pension systems that is new to the pension literature. It addresses both macro- and micro-economic issues, which although intricately related had heretofore been treated separately.

Its conclusion is unambiguous: adopting state-of-the-art asset management techniques and suitably designed investment solutions before the region's demographic window of opportunity closes, could go a long way in helping East Asia avert looming pension crises.

We are grateful to AXA Investment Managers for their support of this study and for ongoing commitment to the "Regulation and Institutional Investment" research chair at EDHEC-Risk Institute.

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Two of the most commonplace stylised facts about East Asia have to do with pension issues: the region's population is ageing fast and its household sector has high savings rates. Both ideas are intuitively related: as demographic transitions occur, more individuals should save in preparation for their retirement.

In this paper, we examine the relationship between savings and retirement income in East Asia, defined as North-East Asia and Greater China (Japan, Korea, Taiwan, China and Hong Kong).

Are East Asia's savings invested in dedicated pension plans designed to deliver post-retirement income? Are these plans, when they exist, adequately designed?

These questions are part of a broader issue: how should a society adapt to changes in its age structure to finance and maintain its present and future standard of living, especially when the share of the elderly in the population is set to increase continuously?

Demographic transitions are epochal: they happen only once and create both risks and opportunities. For this reason, it matters for most countries to learn from those who experience these changes first. In this perspective, East Asia makes for an interesting case study for the rest of the world, since it is experiencing the fastest demographic transition in the world and in history.

The challenges of pension asset management in East Asia

Households save but not in pension plans.

Under the classic lifecycle hypothesis, according to which individuals aim to smooth their consumption profile by varying periods of borrowing, savings and dissavings during their life, demographic transitions should coincide with an initial increase in aggregate savings as the workforce prepares to finance its consumption during retirement.

Hence an apparent puzzle: in East Asia, the demographic transition is in full swing and saving rates are amongst the highest in the world, but only a small proportion of savings is allocated to pensions schemes dedicated to meeting retirement income objectives.

Indeed, even taking into account the high level of public sector savings in the region, domestic household savings remain very high by international standards. However, it appears that, from China to Japan, households hold most of their financial assets in cash or very liquid instruments, and little of their savings is channelled towards dedicated pension schemes.

In fact, the size of the pension sector is such that public pension reserves often represent more than two thirds of pension-related assets, suggesting that private pension accumulation has barely started to take place in the region. While this may be expected in countries that have recently created funded pension schemes, such as China, the Japanese example suggests that

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50 years of pension reforms may not necessarily lead very far if sufficient incentives are not in place.

Thus, East Asia's households clearly have incentives to save but mostly not in dedicated pension schemes, and it follows from this absence of intermediation of short-term household savings into long-term retirement income solutions, that future retirees face a substantial risk of inadequate retirement income and even poverty in old age, while the current workforce and the next generation face a non negligible risk of having to finance the consumption of retirees though increasing public and private transfers.

In this paper, we highlight three challenges that need to be addressed to improve pension outcomes in East Asia:

- A demographic challenge, which is driving the dynamics of the liability to which future retirees and society are exposed;
- An investment challenge, which springs from the economic fundamentals of the region, in particular, a number of structural financial distortions introduced by the so-called `East Asian model' of economic development; and
- A regulation challenge, since East Asia needs to incentivise adequate accumulation in investment vehicles dedicated to meeting adequate consumption targets.

Population ageing is compounding the absence of pension savings intermediation.

The absence of intermediation discussed above i.e. the fact that most individual savings in East Asia are not invested in dedicated pension funds or strategies, is all the more problematic when the need to finance old age consumption increases continuously.

Recent research shows that as populations age and economies develop, the per capita consumption of retirees, especially their consumption of healthcare, grows very rapidly, over and above consumption levels observed during their working life. If healthcare is mostly public and financed by taxing current workers, population ageing can thus impair the ability of the next generation to save for its own retirement.

Thus, while achieving post-retirement consumption objectives is the first order problem in pension solution design, population ageing creates a dynamic consumption objective, at both aggregate and per capita levels, across several generations. This liability process is typically not taken into account in public policy and in the management of pension savings, including public pension or social security reserves.

In East Asia, fertility rates have been consistently and durably below the replacement rate. As a consequence, the region is experiencing the most rapid demographic transition in history and the impact of population ageing is expected to be very

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severe. Indeed, if Japan is any indication of the future demographic trajectory of the rest of East Asia, as the demographic literature strongly suggests, fertility will stay low in the region for a long time. Hence, population ageing will continue in East Asia for the foreseeable future.

Countries that can accommodate some immigration, like Hong Kong or Taiwan, can increase the size of their workforce by promoting the resettlement of foreign labour to manage their demographic predicament. However, such immigration policies can be controversial. In countries like Japan, Korea and China, which are structurally incapable of receiving a large net inflow of migrants, ongoing and accelerating population ageing creates a much more urgent and unavoidable problem. Together, these countries represented 95% of East Asia's GDP and 98% of its population in 2011.

During a demographic transition, the workforce first grows faster than the total population resulting in a mechanical growth of output per capita, even if labour productivity does not increase. This is known as the `first demographic dividend' and arises because the population is concentrated in ages during which production exceeds consumption: the growth rate of the number of effective producers exceeds that of the number of effective consumers.

The first demographic dividend is necessarily transitory and with population ageing, it is eventually reversed and becomes a drag on economic growth. Looking at a global sample, Lee and Mason (2010) calculate that the largest declines in wealth by 2050 will occur in South Korea, Japan and Taiwan.

However, the literature also highlights the possibility of a second demographic dividend: the consequence of the accumulation of savings resulting from the initial rapid increase of the proportion of workers in the total population.

Higher savings should translate into higher investment per worker and this `capital deepening' (higher capital investment per unit of labour) should also lead to higher labour productivity. This transmission channel is particularly important once population ageing has begun and the workforce has started to shrink. Here, the savings of retirees are expected to support labour productivity growth and offset the reversal of the first demographic dividend (Lee and Mason, 2011).

Still, for the last stage of demographic transition to yield a new dividend, much depends on the uses that are made of the accumulated savings, including pension assets.

The demographic literature typically assumes that retirement savings will be channeled into efficient, productive and sustainable endeavours. However, if for example, most pension savings are invested in government bonds, the proceeds of which are used to support increasingly expensive public healthcare and long-term care programs for the elderly, the link

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between pension savings and long-term growth can seem tenuous at best.

Thus, the investment and the management of the large pools of savings that now exist in East Asia have potentially far reaching consequences on the outcome of population ageing and this is partly a function of the type of pension schemes that are made available for current workers and retirees.

Moreover, while the hypothesis that savings must rise during the first stages of the demographic transition is confirmed by empirical studies, recent research suggests that the next phase of the `pure lifecycle model', during which individuals are expected to dis-save, does not currently apply in numerous parts of the world, including East Asia.

Data collected for the National Transfer Account project (NTA), covering 26 countries spanning the global distribution of income per capita since the 1980s, allows the calculation of a lifecycle deficit (LCD) for each age in a population: the difference between all private and public consumption (publicly provided goods and services) and all labour income from the formal sector including self employment and any contributions made by employers, before any taxes.

The lifecycle deficit of each age tranche in the population is simply the difference between its total consumption and its labour income in that period. As a matter of accounting identity, lifecycle deficits are equal to the sum of net transfers (public and private), plus asset income minus savings in that period.

In other words, for each age group, inflows (labour income, transfers and asset income) must be matched by outflows (consumption, transfers and savings) and by construction, lifecycle deficits are funded by net private and public transfers and by asset income or debt.

We find a very strong, linear relationship between the lifecycle surplus of the workforce and GDP per capita and a similarly robust linear relationship between GDP per capita and the combined lifecycle deficit of the younger and older segments of the population. The deficit however grows roughly three times as fast as the corresponding surplus. NTA data thus suggest a clear `lifecycle deficit path' as economies move up the GDP per capita scale.

Some key findings for the NTA project challenges two important hypotheses used in the pure lifecycle model, which underpins so much pension thinking:

- **No more consumption smoothing**: In younger and poorer populations, the per capita consumption profile of the elderly is lower than that of the workforce. As the economy develops and life expectancy increases, the age consumption profile becomes flat across the lifecycle, but eventually the per capita consumption of the elderly becomes the highest of the population if both public and private

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consumption are taken into account.

This suggests that the objective of pension savings may have little to do with consumption smoothing. If the majority of old age consumption is public healthcare financed by taxing the workforce (i.e. the next generation) then assuming no free-riding between generations, a pool of several generations could consider this consumption objective to be its liability target. If, on the contrary, the majority of old-age healthcare consumption is privately financed, then it is a liability for each generation of retirees and should be part of its post-retirement consumption objectives, with important implications for pension savings investment choices.

- **Retirees do not dis-save**. In most countries in the world (where healthcare is mostly financed by public transfers), there is currently no evidence of dissavings in old age: current retirees have continued to have positive net savings and to accumulate financial assets after they have retired, while the workforce supports most of the increasing healthcare costs of old age as well as the increasing education costs of young age.

  The only clearly documented case of old age dissaving is found in the U.S. In the rest of the world, *current* retirees are not particularly at risk because they receive substantial public transfers and thus can also continue to accumulate.

Thus, both at the individual and at the aggregate level, **population ageing, combined with higher wealth per capita, creates a predictable and increasing liability process** defined as the per capita consumption in each post-retirement year, as well as in each pre-work year. In most countries, this liability is mostly the result of the increasing cost of education and healthcare per capita that is concomitant with population ageing. This liability is both that of the nation and of each individual across several generations.

Instead of invalidating the lifecycle model, these findings suggest that the existence of generous public pensions and social security creates *a generational lag* in the need for individuals to adapt their savings and consumption behaviour, as a function of their ability to generate an income.

The current generation would thus be benefiting from exceptionally favourable circumstances and the necessary adaptation to the impact of demographic change may have to be borne entirely by following generations.

Importantly, this outcome has so far removed much incentive for retirees to invest their pension savings in order to meet their effective consumption level since most of this consumption is not financed by their savings. If, as the NTA data shows, **current retirees do not need on average to dis-save, then even the most conservative allocation of their pension savings is sufficient. This, in turn, has considerably lowered the demand for optimal investment solutions so far**.

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Moreover, the liability represented by the rising lifecycle deficit of the elderly, whether it is their own or that of the current workforce/taxpayers, or both, is thus **not explicitly taken into account in the planning and management of pensions savings**, especially public pension reserves or the next generation of retirees.

It remains that this liability must be financed. Three sources of funds can be envisaged:

1. Transfers
   a) private transfers mostly within families from workers to dependents;
   b) and public transfers through taxation (mostly of the workforce);

2. Debt, mostly public debt (i.e. taxation of the next generation of workers);
3. Asset income (public or private), mostly through the accumulation and successful investment of private savings.

In other words, much relies on the current workforce and its savings and investment options and decisions.

Indeed, given the limits on the level of transfers and in order to preserve fiscal stability, asset income is an essential part of the solution. Next, **increasing asset income (which, under the NTA definition includes dis-saving) implies either increasing accumulation, or investment income, or both**. But as we have argued above, accumulation is already at historic highs in the region and in the history of the world economy. Likewise, the level of effective public indebtedness is already high, as China's recent sovereign rating downgrade suggests. It follows that the fundamental issue is one of intermediation.

Finally, increasing investment income to meet current and future consumption objectives raises two more challenges in the case of East Asia: an investment challenge and a regulation challenge, which we discuss next.

Scientific investment management is hampered by structural financial distortions.

The macroeconomic context in which the investment of pension savings must take place is specific to the region. East Asia's economies have grown according to a model that has favoured export and investment that has led to well-documented and enduring distortions of economic and financial systems.

While the so-called East Asian economic development model has been extremely successful at delivering fast growth and development in the region, in the long run, which is the relevant horizon for pension investment, the distortions that have been introduced in the economy can become very difficult to reverse. These structural financial distortions can then make the investment of East Asia's pension savings very challenging.

It is a well-documented feature of the so-called `East Asian miracle' that governments all over the region engage in more

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or less benign `financial repression', which manifests itself in particular through durably below-equilibrium interest rates, especially real interest rates. Financial repression acts as a form of tax on savers and subsidy of borrowers. It has far reaching consequences which directly affect the saving behaviour of individuals and the investment of pension assets.

In tandem with directed capital allocation through the banking system in the context of an aggressive industrial policy, financial repression policy has been a staple of the Japanese development model and has also been replicated in the rest of the region, especially in Korea and China.

The first consequence of financial repression is to make the return on cash and fixed income securities very low and even negative in real terms. While this lightens the debt burden of the state-sponsored sector (i.e. firms that have privileged access to credit) and that of the public sector itself, it also forces households to save more.

This counter-intuitive result fits the so-called 'target saving hypothesis' by which households engage in an intuitive form of asset-liability management: under this hypothesis, households have more or less precise expenditure targets in mind (university fees, house or car purchase, rainy day fund etc.) and accumulate accordingly. It follows that the lower the real return on savings, the more housholds accumulate, even when returns are negative. This behaviour is confirmed by empirical research in the region.

The second important consequence of financial repression is to contribute to the build-up of excess savings in the economy. Excess savings imply a dynamically inefficient economy i.e. an economy which fails to balance short- and long-term objectives, which has direct implications for asset allocation.

Like the household sector, East Asia's governments and firms, especially state-controlled firms, have accumulated vast savings in the context of a continued effort to control the inflationary impact of a structural current account surplus, itself the consequence of a structural trade surplus. Monetary authorities routinely engage in sterilisation programmes by which they exclude new foreign exchange from circulation in the domestic economy, thus building large foreign exchange reserves (and a matching capital account deficit) and controlling the inflationary impact of positive net exports.

Structural excess savings result from these sterilisation policies, which prevent liquidities from circulating through forced institutional savings (sterilisation bonds, reserve ratios, state-owned Enterprises savings, etc.) and, along with cash hoarding by households, have led to a continued decrease of the velocity of money in East Asia since the 1970s, which is a unique phenomenon in the history of the world economy. Moreover, to minimise the cost of sterilisation, interest rates have to be kept durably low, thus re-enforcing financial repression.

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The third consequence of financial repression, in combination with excess savings, is the costly misallocation of large amounts of capital. Banks play a pivotal role in capital allocation in East Asia, and the combination of large captive deposits with interventionist credit allocation policies by the central government can lead to the issuance of an excessive amount of loans.

Excessive origination leads to the financing of numerous value-destroying projects and generally to the over-leveraging of large parts of the economy (e.g. real estate), well-documented excess capacity in a number of industrial sectors (e.g. steel production, shipyards, infrastructure, etc.) and eventually a build-up of non-performing loans which can threaten the viability of the entire financial sector (e.g. Japan in 1991, Korea in 1998, China in 1999, Taiwan in 2003, etc.)

This excessive leveraging of the economy translates into excessive volatility for investments in risky assets. The structurally higher levels of volatility experienced in Asian stock markets are now well-documented in the literature. Likewise, asset price bubbles, especially in the real estate sector, have been frequently experienced in the region and are well-documented in academic research.

Japan's experience is again a cautionary tale for the rest of East Asia. The combined result of a stock market crash, a real estate bubble and the ensuing banking crisis have led to a `balance sheet recession' (Koo, 2003) that has greatly limited the possibility to access the equity risk premia for domestic investors over the past two decades, and a `liquidity trap' condemning monetary policy to keep interest rates near zero.

Thus, the so-called East Asian economic development model can create specific challenges for investing long-term pension assets: namely, very low, sometimes negative returns on cash and low risk assets and very high, perhaps excessive volatility of risky assets.

While risk mis-pricing in both fixed income and equity spheres hampers efficient asset allocation efforts, the potential absence of straightforward mean-reversion of the equity risk premium can be a major impediment to strategies based on exploiting such phenomena.

Risk control can also become limited when the risks to insure or hedge are not transient but the product of structural market distortions.

The difficulty with this economic development model is that it becomes very hard to reverse. The subsidies to firms' and the government's costs of capital can become very addictive. Because debt is cheap, debt is everywhere and the slightest increase in interest rates (a move towards ending financial repression) could create significant damage in particular to sub-sovereign public sector balance sheets.

In effect, any attempt to design adequate pension investment solutions in this context will require addressing these problems in an

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open and systematic way, and may even contribute to the macro-prudential policy debate.

Regulation must channel East Asia savings towards adequate investment solutions.

The regulation challenge is to create the conditions for a better accumulation and management of East Asia's savings in the region to meet the aggregate and individual liabilities driven by population ageing while maintaining fiscal stability.

Few options currently exist for individuals to do so. This explains the lack of interest in pension schemes, which remain, for the most part, a form of deferred compensation that does not create a pension (i.e. retirement income), but instead almost always pays a lump sum.

Likewise, the largest pool of assets, pension reserves, and social security reserves when they exist (e.g. in China) are not managed to address the growing lifecycle deficits that characterise an ageing society, despite the facts that these evolutions are in great part predictable.

In this perspective, we examine potential improvements to pension reserve funds, corporate and occupational defined-benefit plans and defined-contribution plans.

Reserve funds are not solely used to tackle the challenges awaiting public pensions

In our review of the role of pension reserve funds in East Asia, we find that while they are by far the most significant element of the funded pension sector in the region, they suffer from important flaws.

Nevertheless, the existence of these large reserves represents a **unique opportunity** for East Asia's government to address the un-sustainability of public pay-as-you-go (PAYG) pension schemes resulting from population ageing.

We argue that seizing this opportunity will require making fundamental changes in the way reserve funds have been controlled and managed over the past decades, and adopting investment management processes and tools that will allow pension reserves to achieve what should be their sole objective: to support the public pension system by minimising the burden of pension liabilities on future generations while ensuring adequate public pension provision.

Pension reserves have been a side-product of the rapid demographic transition that has occurred in East Asia. An initial drop in infant mortality in the 1950s led to a larger cohort of newborns who entered the workforce and started contributing to PAYG pensions from the 1970s onwards, at a time when the population of retirees and older workers about to retire was still relatively small.

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This creates surplus contributions, which are kept in a dedicated reserve fund, with the knowledge that demographic transitions eventually lead to population ageing, and thus that the number of workers contributing to PAYG systems will decrease, as the number of retirees increases. At that stage, the pension reserve is expected to support the public pension system by making part of the pension payments due.

However, while pension reserves were created to address the issue of population ageing and the sustainability of PAYG systems, the management of the reserves has remained mostly unrelated to that objective. Moreover, the dominant paradigm of pension reserve management consists of the passive adaptation of the pension system to demographic realities as opposed to the active management of a dynamic liability.

Thus, the governments of East Asia expect to have spent almost all of the pension reserves by the middle of this century, while little to no effort is put into increasing investment income from these large pools of assets.

Instead, most of the parameters of the PAYG pension equation are being reshuffled regularly and seemingly independently: parametric reforms lead to changes in contribution rates, benefit levels, accrual formulas or discount rates, while actuarial and other assumptions such as life expectancy and economic growth forecasts spanning 20 to 100 years are adjusted after each review. Moreover, these reforms are often piecemeal and considerably delayed. They also tend to fail to address any accumulated shortfall before they come into force.

It follows that adequate long-term investment objectives in line with a clear estimation of liabilities are not set, nor are short-term constraints properly defined.

In East Asia, pension reserves exist in the context of private sector workers, pay-as-you-go pensions in Japan, Korea, Mainland China and Taiwan. Specific pension reserves also exist for public workers in Japan, Korea and Taiwan. Hong Kong has no PAYG pension system and therefore no dedicated pension reserve. Mainland China has also created a specific reserve fund dedicated to supporting the pension system but it is funded directly by the state instead of surplus contributions.

In Japan and Taiwan, pension reserves represent 70% of all funded pension assets. In China, reserves are equivalent to 80% of all pension assets and in Korea, the reserve stands at 90% of pension assets.

These large numbers hide two important stylised facts about funded pensions in East Asia. First, pension reserves are large because corporate and occupational pensions are small, as we discuss in sections 4 and 5.

Second, East Asia's pension reserves may be large, even by international standards, but they are not as large as they should be given their levels of contribution and promised benefits, as well as the rate of delinquency in certain countries. Moreover, in countries

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that initially developed primarily thanks to an export-driven model, wage competitiveness remains a key element of economic success and this can be in contradiction with the objective of collecting pension contributions.

As a consequence, pension reserves already exhibit significant shortfalls and part of the benefits paid have to be subsidised by central governments.

Thus, while reserves continue to grow in China, Korea and Taiwan, they should be growing faster if future pension payments are going to be met. In these three countries, all pension reserve funds are known to exhibit significant unfunded liabilities. In Japan, reserves have begun to shrink since 2004. And while the link between demographics and reserves suggests that the latter should eventually peak, it is striking to observe that the Japanese reserve fund, as a consequence of its investment policy, has barely generated any investment income over the past decade.

Clearly, the asset management of pension reserves could be improved to help meet the liabilities of pay-as-you-go systems. Pay-as-you-go pensions in East Asia are the only [1] reliable source of *lifelong* retirement income, since, as we discuss in sections 4 and 5, private pension schemes offer little to no annuitisation. Moreover, given the limited development of private pensions, PAYG systems are often the *sole* source of retirement income for a whole stratum of the population.

The erosion of pay-as-you-go benefits in the context of parametric reforms cannot continue indefinitely before serious social consequences appear, including increasing old-age poverty but also increasing contribution delinquency. Likewise, if the cost of old age (lifecycle deficits) is also bound to increase faster than the capacity to contribute of the workforce, the continued central government support of public pension and healthcare systems cannot be extended indefinitely without impacting fiscal stability.

Instead, adequate risk management can allow reserve funds to invest to maximise the probability to meet their liabilities (liability-driven investing) while controlling risk (risk-controlled investing) and taking their specific investment horizon into account (life-cycle investing).

Our review also highlights a number of stylised facts about East Asia's pension reserve funds.

Long-term objective setting and short-term constraints

- Pension reserves are often given multiple objectives, some of which are unrelated to the supporting the public pension system and may even be in contradiction with that goal. Examples include direct lending to protected industrial sectors, interventions in stock markets and the absorption of large volumes of public debt.
- In effect, pension reserve management is seldom independent from political

1 - We note that other Asian countries, such as Singapore, which is out of the scope of this study, have made significant progress towards the development of annuitisation (see for example Fong et al., 2011)

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influence. Direct central government involvement is the norm.

- Pension reserves are exposed to significant longevity and inflation risk but their investment objectives are not necessarily set so that they manage these risks explicitly.
- In general, reserve funds have loosely defined objectives and no precise assessment of their liabilities. Long-term objectives are easily ignored and much more attention is given to short-term objectives. With too much focus on the short-term, high loss aversion dominates investment decisions and can lead to highly suboptimal results.
- East Asia's reserve funds are also found to have rather ill-defined short-term constraints, if any official constraints at all. Along with the absence of clearly defined long- term objectives, this state of affairs precludes the definition and development of adequate investment solutions for reserve funds. Indeed, the short-termism and loss aversion mentioned above play the role of *de facto* short-term constraints.
- Funding rules in particular are expressed in terms of multiples of future obligations which are defined statically and thus leave the dynamic dimension of the fund's liability out of the equation.

Investment management

- The lack of independence highlighted above leads to an equally politicised investment governance. Investment committees and policies, when they exist, are more advisory in nature and much decision making power remains in the hands of political appointees.
- Asset allocation decisions in East Asia's reserve pension funds remain biased towards local investments and fixed income.
- However, practices have also evolved in recent years. In particular, Taiwanese and Chinese reserves have seemingly learned from the limitations of the Japanese experience. Thus, there is a trend towards increasing international diversification.
- Japanese and Korean funds have a fixed income bias. In contrast, Taiwanese and the flagship Mainland Chinese reserve funds (NSSF) have moved from similarly fixed income focused allocations to more balanced choices. However, each attempt to improve diversification is done on a piecemeal basis and relies on potentially inadequate approaches.
- Alternative investments have also become part of the asset classes used by the Korea's and China's reserve funds.
- The balance between active and passive mandates is also evolving with a higher proportion of assets dedicated to active managers. The tendency to manage most assets internally has also shifted with the forays into new asset classes by Korean or Chinese reserve funds.

Investment management approaches in pension reserve funds have undeniably evolved and improved over the past decades. However, the management of the reserves remains too dependent on the conditions of the domestic economy and continues to be executed without trying to

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improve the ability of the reserve fund to support the public pension system.

Thus, improvements are possible on several fronts, from better governance to the implementation of proper risk management techniques.

Governance improvements

- Pension reserves need a clear mission and would benefit from full independence from government involvement. In particular, they should not be used to absorb excessive amounts of public sector debt.
- The appointment process for the governing board and the responsibilities of members could be clearly defined and focus on expertise and independence.
- Ring-fencing of reserve fund assets would ensure that this capital will only be used for the payment of pensions.
- Reporting should be improved and periodic internal and external audits should be performed to ensure that both the governance and the investment processes are adequate and follow the mandate.

Risk management improvements

- Next, reserve funds should acknowledge and clarify the liability process to which they are exposed and propose well-documented long-term investment objectives. Their regulator could, in turn, clarify adequate and transparent short-term constraints.
- Reserve funds need to develop proper asset-liability management (ALM) and liability-driven investment (LDI) strategies to be in a position to meet their long-term objectives while respecting these short-term constraints.
- Acceptable risk levels also need to be clearly defined, in order to allow the implementation of risk-controlled strategies.
- A clear and fathomable investment horizon is necessary. A one hundred year horizon for example, as in the case of Japan's reserve fund, leaves too much uncertainty unmanaged to guarantee time consistency.
- An important part of these reserve funds' objectives should be to improve asset income in order to minimise the intergenerational burden created by population ageing while providing adequate pension income for retirees.

Other countries that faced similar issues have addressed the situation by splitting off reserve funds; creating a fully-dedicated reserve fund to support the public pension system, and other dedicated funds that serve other objectives, e.g. economic stabilisation or development funds for socio-economic projects such as infrastructure.

Next, we argue that similar solutions are needed for private pension schemes. However, the importance of these ideas with regard to pension reserves simply springs from their size and role in a region where most savings are still not invested in pension plans, and as thus less likely to

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provide adequate retirement income to the next generation of retirees.

Corporate defined-benefit plans rarely provide post-retirement income.

In East Asia, there is a strong link between the traditional retirement allowance system, which has been prevalent in corporate culture for decades, and the existence and characteristics of corporate or occupational defined-benefit pension funds.

Private defined-benefit (DB) plans have existed in the region since the 1960s in the case of Japan or have been introduced as late as 2005 in the case of Korea. However, even when DB plans have existed for decades, and contrary to other jurisdictions (e.g. the US), they have not become a dominant part of the pension system.

They also generally refrain from providing any pension income to retirees, but instead pay lump sums either because they are the preferred choice or the only option available.

Thus, the benefits paid by private DB plans in East Asia are only `defined' or guaranteed insofar as they represent a certain multiple of past wages, according to the relevant formula available when plan members retire or leave their position. Post-retirement solutions, including the management of longevity and inflation risks, remain beyond the scope of what these plans have been offering so far, with a few exceptions.

As a form of deferred compensation, East Asia's private DB plans have seen their assets grow initially because they are typically preferred by the large conglomerates that make up the core of East Asia industrial fabric. However, private DB asset growth typically tailed off once large employers had adopted them, unless they are made mandatory.

DB plans also stopped growing because new legislation was introduced to promote defined-contribution (DC) plans.

Thus, DB assets have not grown for many years in Japan, but have only been transferred from one scheme to the next, as reforms aimed at improving the governance, performance but also the growth of the sector still continue to unfold. They remain voluntary schemes only.

In Hong Kong, where DB plans are also voluntary, membership stopped growing despite such plans still being open to new members, once DC pensions became mainstream, offering full and immediate vesting, which is not the case with DB plans. Cumulative asset growth is now limited and mostly driven by investment performance (in 2011, DB assets had returned to their 2007 level).

In Korea, where corporate plans have only been mandatory since 2011, assets in DB schemes are still growing rather fast but such plans have only been introduced in 2005, and it remains to be seen whether this trend can continue once large corporations have adopted them. In

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2012, 16.5% of permanent employees in Korea worked for a large firm (of more than 300 employees), excluding the public sector. Indeed, while private pensions are now mandatory, employers have a choice between DB and DC plans.

Our review of corporate and occupational DB plans in East Asia yields a number of salient points, which we summarise below.

Size and significance

- Corporate and occupational DB plans only exist in Japan, Hong Kong and Korea, where their cumulative assets represented 16%, 6% and 2% of GDP, respectively, in 2011
- These plans have mostly remained voluntary and have thus failed to grow on a scale commensurate with other supplementary pension systems in the rest of the world. Only Korea introduced mandatory corporate pensions in 2011, but with a choice between DB and DC schemes.
- While they represent a sector of limited size, private DB funds remain the second largest pension asset pool in East Asia, after reserve funds, which are much larger.
- With the exception of Korea, which introduced DB plans recently, asset growth has tended to tail off once a certain level of coverage had been achieved.

Funding and benefits

- In Japan (70%) and Korea (100%), DB plans are of a contractual nature i.e. they do not exist as independent funds but are effectively investment mandates given to asset managers. Actual corporate pension funds exist in Hong Kong and to a lesser extent in Japan. Contractual plans also exist in Hong Kong.
- Funding is mostly provided by employers and the combination of a mandatory minimum accrual with the absence of a minimum contribution can lead to unfunded liabilities.
- Vesting rules in East Asia are often unclear and not statutory, although full vesting in Japanese and Korean DB plans after three years is common practice. Recent reforms in Hong Kong have improved benefit rights vesting.
- Private DB plans do not necessarily provide a pension (i.e. an annuitised income stream). Instead, most such schemes pay a lump sum. In Japan, annuities are available for individuals with more than 20 years of contributions, but they are not preferred. In Korea, annuity duration is limited to 5 years, and are not available elsewhere in DB plans in the region.
- Thus, longevity risk is mostly irrelevant for sponsors, and the extent to which indexation impacts liabilities is more limited than in the case of life-long indexed pensions common in other DB schemes globally.

Objectives and constraints

- Since private DB plans typically pay out lump sums at the date of retirement or departure of employees, they have very loosely defined long-term investment

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objectives, typically focused on capital preservation.

- The necessity to pay a lump sum when an employee leaves a position also forces such plans to hold large amounts of cash or very liquid, low-yielding securities.
- Investment restrictions minimise exposure to listed equities (e.g. Korea) or ban unlisted investments (e.g. Hong Kong).
- In Japan, DB plans have higher allocations to equities (above 50%). Otherwise, private DB plans in the rest of East Asia are invested in low-yielding assets. Korean DB plans hold more than 90% of their assets in low-yielding liquid instruments, including more than 50% in cash.
- In effect, the focus on paying lump sums leads to a virtual abandonment of the investment management question that should be addressed in the context of corporate DB funds and creates potentially substantial opportunity costs for sponsors. There is seldom evidence of asset-liability management (ALM) and funding and accrual rules creating enough leeway to minimise employer contributions in the short-term.
- Required funding levels are typically 100% in Japan and Hong Kong and 90% in Korea, but monitoring and implementation are limited and sponsor action negotiable. Underfunding is frequent but varies considerably from occasional in Hong Kong DB plans, to quasi-systematic in Korea or Japan.

Improvements for plan sponsors

- The problem faced by DB funds in East Asia is rather simpler than for most DB schemes in the rest of the world since they are mostly not exposed to longevity risk, and only exposed to indexation risks until the retirement or departure date of employees.
- East Asia's corporate DB plans need to improve their funding level and volatility in the context of more stringent regulation and the need to minimise demands on sponsors since higher contributions may not be economically feasible and shortfall risk is borne by plan sponsors. Indeed, short-term funding ratio constraints would not be costly for pension funds if they accepted to implement risk-management strategies that are optimal given such constraints.
- A liability-hedging portfolio helps meet guarantees and allows for capital preservation, while freeing up a risk budget to improve profitability and thereby reduce the cost burden on the employer.
  However, a simple application of ALM models would not be optimal for an occupational DB fund backed by a sponsor. Martellini et al. (2012) develop an integrated an ALM model that explicitly accounts for this implicit guarantee, recognising that it is more or less risky depending on the health of the sponsor.
- Moreover, smarter surplus sharing rules should be encouraged. In particular, giving plan members access to part of the surplus will encourage more risk-taking, which is typically in the interest of the sponsor, while imposing a cap on the terminal funding ratio can allow

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the purchase of downside insurance and improve the safety of the investment strategy.

Improvements for plan members

- The absence of post-retirement income provision in the majority of East Asia's private DB plans leaves the issue of longevity risk and achieving a given level of post-retirement income entirely to individuals.
- A greater level of risk sharing with sponsors during the post-retirement phase would obviously be beneficial to plan members. However, given the history of such plans in the region such increased risk sharing seems unlikely unless some form of annuitisation is made mandatory by the regulator.
- Still, options exist to improve risk sharing. Options include buy-ins [2], buy-outs [3] or longevity swaps [4] for DB pension plans. A buy-in would entail an insurance policy held by the trustee, while a buy-out would be held by the plan member. Full buy-outs are quite costly, as they entail the immediate payment of any plan shortfall. As a consequence, partial insurance is much more common.

Hence, the private DB sector in East Asia remains rather underdeveloped despite having the longest history of all the corporate and occupational plans in the region. Assets have grown initially but this growth has typically slowed markedly after a while and total assets never came to represent a large share of GDP.

Mostly voluntary schemes funded solely by employers and mostly set up as contractual plans with external managers have not led to the creation of a strong corporate pension sector, but instead have become an avatar of the retirement allowance preference that has historically defined East Asian corporate culture.

The role of pensions as a source of deferred pay to reward loyal employees and provide long-term incentives to managers has long been recognised in practice and in the academic literature (Blake, 2006). Corporate pensions in East Asia essentially continue to play this role but not that of providing retirement income to members.

In the absence of improved risk sharing between plan sponsors and member during the post-retirement phase, individuals who receive lump sum benefits must manage their own retirement savings to finance the share of their lifecycle deficit that is not covered by public pensions.

In this context, DB lump sums can be used to access DC solutions when individuals change position or retire.

Defined-contribution plans are not incentivised and do not offer post-retirement solutions.

DC options now exist in Hong Kong, Japan, Korea, Taiwan and China. In Hong Kong, they were introduced 20 years ago as a voluntary type of occupational pension plan before becoming the main mandatory pension

2 - An insurance policy covering benefits for a selection of pensioners. The trustees continue to manage the scheme but have certainty about the plan's costs. The insurer write a policy in the name of the trustees

3 - Buy-outs involve the transfer of the scheme's asset and liabilities to a regulate insurer. The sponsor and trustees are fully discharged of the pension liability. The insurer then write a policy in the name of individual members

4 - A contract by which one party makes regular payments based on agreed mortality assumptions to an investment bank or insurer and, in return, the bank or insurer pays out amounts based on the scheme's actual mortality rates. This mirrors the structure of an interest rate or inflation swap.

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scheme in 2000, as well as the largest DC system in East Asia.

DC plans have only existed in the region for less than a decade, even in Japan. Mandatory DC exists in Taiwan since 2005. In Korea, mandatory DC plans have only existed since 2011 (Voluntary DB plans have existed since 2005).

Thus, with the exception of Hong Kong, DC plans remain a marginal dimension of pension systems in the region, even though assets are beginning to grow in a number of jurisdictions, especially Taiwan.

In 2012, DC assets represented 30% of GDP in Hong Kong, but less than 5% everywhere else in the region. In Japan, where DC plans have existed for more than a decade but remain voluntary, cumulative assets amount to less than 2% of GDP.

The well-documented shift to DC pensions in other parts of the world has nevertheless begun in the East Asia: except in Hong Kong, where DC coverage is higher, assets are growing rapidly in other countries, albeit starting from a low base. In Taiwan, where DC has been made mandatory, membership growth reaches 10% per year.

In countries where DC was only introduced recently and alternative options are available (e.g. Korea), it remains to be seen if this growth will continue or not. Indeed, both firms and employees may continue to prefer corporate DB plans.

Pension schemes are supposed to create incentives to save on the one hand, and to help manage these savings to meet lifecycle consumption objectives on the other.

However, as discussed above, East Asia already has very high household and domestic savings rates and, in effect, exhibits excess savings at both micro and macroeconomic levels. Incentives to save more are thus likely to be redundant. **The key question is one of creating incentives to save into dedicated pension schemes that are designed to support post-retirement consumption objectives.**

So far, DC schemes in East Asia mostly fail on both counts. They create few if any incentives to use them instead of regular savings accounts. They also fail to offer much post-retirement investment solutions that would justify channelling existing savings into such accounts.

First, when plans are voluntary, incentives are limited because employees are either not allowed or not incentivised to save in DC plans. The employer also often acts as a gatekeeper of any access to DC plans, even individual ones. But employers are also given scant tax incentives to offer this option.

Mandatory DC schemes may also have vesting and portability issues and contribution compliance is variable in some jurisdictions. Contribution ceilings can also be set very low and minimise the use of such plans.

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Second, like the immense majority of private pension schemes in East Asia, DC schemes, whether they are corporate or individual plans, do not offer any post-retirement income but instead pay a lump sum.

Annuitisation is possible in some cases but typically not for a long period and annuity markets are generally small and expensive (especially in a macroeconomic environment in which interest rates are durably kept artificially low, as discussed above).

It follows that **in order for DC plans to develop and help resolve the issues of funding lifecycle deficits of ageing populations in East Asia, they need to be made more accessible and attractive and they need to contribute to providing post-retirement income solutions, as opposed to a very inefficient form of savings substitution.**

Next, our review highlights the following stylised facts about DC plans in East Asia.

Hybridity

- Hybridity, or the level of risk sharing between plan sponsor and plan contributors, is limited in DC plans available in the region.
- Individual accounts in Hong Kong or China typically correspond to the `pure' form of DC plans, in which individuals bear all investment risk and must decide on an investment strategy.
- Collective DC schemes in Taiwan or in some cases in Japan offer some risk pooling.
- Principal guarantees and indexation clauses are available in some jurisdictions, especially in Korea, Taiwan and Japan.

Incentives to save

- Contribution rates are usually set at inappropriate levels, both minimum and maximum levels can be too low.
- The tax deductibility of contributions for the employer is either insufficiently attractive, unclear or inexistent.
- Guarantees, when they exist, are seldom taken into account in the investment strategy.
- Vesting and portability are unattractive in a number of cases, even though this aspect has improved in recent years.
- High contribution compliance exists only in Hong Kong, where non-compliance is a criminal offence.

Costs

- Costs are considered to be high in most systems. Low-cost investment solutions, among other things, can help improve cost-efficiency.
- China is an exception and managers' fees are capped at a level considered too low.

Choice and default options

- Most DC plans in the region offer a choice of investment options to plan members, but not Chinese or Taiwanese plans.

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- Only Hong Kong and Korea's employers offer a choice of pension plan provider.
- Regulated default options do not exist. Default options are typically low-risk, principal-guaranteed products or balanced funds, neither of which is appropriate from a lifecycle point of view.
- Investment options can also be too numerous in Japan or Hong Kong for example, leading to the well-documented `choice paralysis'.
- Non-financial risks, e.g. counter-party or liquidity risks, are seldom understood or taken into account.

Improvements

- DC plans, like any pension investment solution, should define long-term objectives either in terms of target wealth or extreme event minimisation, thus allowing a proper asset-liability approach.
- Lifecycle approaches that take the investment horizon of participants into account should be standard and improve on existing static approaches found in `target date' and `lifecycle funds' by applying a dynamic investment solution.
- Asset allocation must be designed using adequate building blocks, in order to maximise diversification benefits while controlling risks and meeting long-term objectives.
- However, fully customised solutions are too expensive for retail investors and pre-packaged standardised ones must be made available to respond to a range of post-retirement investment needs.
- In markets where DC plans are mandatory and may even be the only pension system available (e.g. Hong Kong) forms of mandatory but regulated annuitisation should be considered by the regulator to support the development of an annuitisation industry, while ensuring competitive prices.

Conclusion: Scientific asset management matters for pension outcomes in East Asia

In conclusion, while the demographic and investment challenges that characterise the issue of retirement planning and income generation in East Asia are significant and seemingly intractable, addressing the regulatory challenge discussed above in relation to pension reserves, corporate and occupational defined-benefit plans and corporate and individual defined-contribution plans can go a long way to address the first two sets of issues that we have identified: demographics and the East Asian economic model.

Demographic trends are difficult to offset or reverse and the rise of lifecycle deficits documented by Lee and Mason (2011) suggests that in the absence of new sources of income to support the increase of per capita consumption of the elderly in an ageing society, serious consequences can be expected in terms of either fiscal stability or inter-generational social frictions.

Crucially, the pace of population ageing in East Asia leaves little time for adaptation

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and spreading the cost of the last stage of the demographic transition over several generations.

Likewise, structural financial distortions and macro-economic imbalances create an investment environment for pension savings in which a number of standard hypotheses of academic finance, such as mean reversion, may not apply and thus for make horizon-based investment strategies ineffective. It may also make benchmarking the building blocks of an optimal diversification strategy more difficult if risk is systematically mis-priced, especially in equity markets. This may increase the need to invest internationally to offset such distortions.

Moreover, the longer the eventual rebalancing of some of East Asia's main economies takes, the more painful it is likely to be for a whole generation of savers. As the rebalancing of Japan from the 1990s onwards illustrates, a multi-decade slump can follow a balance-sheet recession, making long-term investment planning difficult.

However, the introduction of scientific investment concepts into the design of pension savings plans will only make these issues more explicit and contribute to a necessary regulatory and macro-prudential debate about the future of such fast ageing societies.

For funded pension systems to deliver levels of wealth in real term that are commensurate with post-retirement consumption objectives, scientific solutions identified in the literature recommend the combined implementation of three investment paradigms: (i) Liability-driven investment or LDI, (ii) lifecycle investment or LCI; and (iii) risk control investment or RCI as defined in Cocquemas (2013):

- Pensions are long-term liabilities, which are in fact dynamic and depend on several time-varying factors. Pension solutions should therefore be designed in order to maximise the likelihood of meeting those liabilities at the horizon. This is the liability driven investing (LDI) framework.
- Furthermore, the horizon of the investor needs to be taken into account formally. As they approach retirement, plan members should be exposed to less risk. The strategy, notably the amount of risk taking, should be dynamic depending on the current wealth and future expected performance, and should explicitly consider the investment horizon. This life-cycle investing (LCI) dimension is therefore crucial to meet the needs of plan members.
- This strategy needs to be implemented while managing risk levels: there need to be short-term constraints too, which take into account the existence of a sponsor when there is one. These constraints can either be self-imposed or defined by the regulator. This is the risk-controlled investing (RCI) approach.

In this context, several important points can be made regarding the improvement of funded pension plans in East Asia.

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Investment solutions for pension reserves can help mitigate the impending public pension crisis.

As we have argued above, the existence of these large reserves represents a **unique opportunity** for East Asia's governments to address the unsustainability of public pay-as-you-go pension schemes resulting from population ageing.

Seizing this opportunity will require making fundamental changes in the way reserve funds have been controlled and managed for the past decades, and adopting investment management processes and tools that will allow pension reserves to achieve what should be their sole objective: to support the public pension system by minimising the burden of pension liabilities on future generations while ensuring adequate public pension provision.

The main changes required include clearly defining the long-term objectives and short-term constraints of reserve funds, and putting in place the governance mechanisms that guarantee that they only attempt to achieve these objectives while respecting binding constraints.

With well-defined objectives and constraints, adequate scientific investment solutions can be defined and implemented, and, in turn, the sustainability of the public pension system can be greatly improved.

Defined-benefit corporate and occupational plans can improve both sponsor and member outcomes if adequate investment management is implemented

As we have discussed above, voluntary schemes funded solely by employers and mostly set up as contractual plans with external managers have not led to the creation of a strong corporate pension sector, but instead have become an avatar of the retirement allowance preference that has historically defined East Asian corporate culture.

Corporate DB pensions in East Asia play a role as a source of deferred pay to reward loyal employees and provide long-term incentives to managers, as has long been recognised in practice and in the academic literature, but they do not provide retirement income.

Two types of improvements should be considered for private DB plans in the region: improvement for sponsors and for members.

First, DB plans need to improve their funding levels and volatility in the context of more stringent regulation and the need to minimise demands on sponsors, since higher contributions may not be economically feasible. For this purpose, the simple application of asset-liability management models, while it allows for capital preservation and freeing up a risk budget to improve profitability, would not be optimal for an occupational DB fund backed by a sponsor. ALM models should explicitly account for the implicit guarantee of the sponsor, and recognise that it is more or

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less risky depending on the health of the sponsor.

In this context, short-term funding ratio constraints would not be costly for pension funds if they accepted to implement risk-management strategies that are optimal given such constraints. Smarter surplus sharing rules should be encouraged. In particular, giving plan members access to part of the surplus will encourage more risk-taking, which is typically in the interest of the sponsor, while imposing a cap on the terminal funding ratio can allow the purchase of downside insurance and improve the safety of the investment strategy.

Second, since East Asia's DB funds in their immense majority only pay a lump sum, longevity and most inflation risk remains with members, making private DB plans a crude type of hybrid plan. Along with the surplus sharing suggested above, greater risk sharing between plan members and sponsors during the post-retirement period can be envisaged even though it may require regulatory intervention to be possible.

The development of mandatory annuitisation as already proposed in other parts of Asia (e.g. Singapore), along with financial contracts allowing the management of longevity risk for sponsors (e.g. buy-ins, buy-outs, longevity swaps) are amongst the solutions requiring future developments of East Asia's financial sector and markets.

Defined-contribution plans remain to be developed into attractive savings vehicles for post-retirement income generation

DC plans leave most risks with individuals but are expected to create incentives to save on the one hand and to help manage these savings to meet lifecycle consumption objectives on the other.

Since East Asia already has very high household and domestic savings rates, **the key question is one of creating incentives to save into dedicated pension schemes that are designed to support post-retirement consumption objectives.**

But East Asia's DC schemes create few if any incentives to use them instead of regular savings accounts. They also fail to offer much in the way of post-retirement investment solutions that would justify channelling existing savings into such accounts.

When plans are voluntary, incentives are limited because employees are either not allowed or not incentivised to save in DC plans. Employers are also given scant tax incentives to choose this option. Mandatory DC schemes may also have vesting and portability issues and contribution compliance is variable in some jurisdictions. Contribution ceilings can also be set very low and minimise the use of such plans.

Moreover, like DB plans in East Asia, DC schemes seldom offer any post-retirement income but instead pay a lump sum.

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Hence, an important issue is to incentivise the use of DC plans by creating clear and adequate incentives to channel existing and future savings into dedicated accounts offering attractive post-retirement investment solutions.

These solutions should take a long-term objective into account (e.g. target wealth) and allow for an ALM approach while integrating investment horizons. They should also make the best use of low-cost investment solutions using optimally designed building blocks. Standardised packages should further reduce complexity and costs. Finally, regulated defaults options should be designed with these criteria in mind.

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1. Investment Solutions are Needed for Pension Savings in East Asia

1. Investment Solutions are Needed for Pension Savings in East Asia

Two of the most commonplace stylised facts about East Asia have to do with pension issues: the region's population is ageing fast and its household sector has high savings rates. Both ideas are intuitively related: as demographic transitions occur, more individuals should save in preparation for their retirement.

In this paper, we examine the relationship between savings and retirement income in East Asia, defined as North-East Asia and Greater China (Japan, Korea, Taiwan, China and Hong Kong).

Are East Asia's savings invested in dedicated pension plans designed to deliver post-retirement income? Are these plans, when they exist, adequately designed?

These questions are part of a broader issue: how should a society adapt to changes in its age structure to finance its present and future standards of living, especially when the share of the elderly in the population is set to increase continuously?

Demographic transitions are epochal: they happen only once and create different risks and opportunities in each society. For this reason, it matters for most countries to learn from those who experience these changes first.

In this perspective, East Asia makes for a most interesting case study since it is experiencing the fastest demographic transition in the world and in history.

East Asia also offers a particularly useful natural experiment: the demographic and economic transitions of Japan, Korea, Taiwan, Hong Kong and China follow largely similar paths but with a lag. Japan is twenty years ahead and can be used as a benchmark case of the impact of rapid ageing and economic development following the so-called 'East Asian model' of State-led export and investment focused growth.

Japan can thus be a point of reference (and of difference) to understand the development and challenges faced by pension systems and wealth management in other East Asian countries both at the macro and micro level. Indeed, one of the main lessons from the Japanese experience is that despite its remarkable success by international standards in terms of wealth creation, it is still faces a grim future.

Of course, while they share demographic trends and numerous economic features with Japan, other East Asian countries are making their own policy and societal choices regarding the role played by transfers, public or private, and asset income in retirement. As a consequence, they will also face their own challenges when it comes to adequately managing pension wealth.

It remains that in an ageing society, **pension asset management matters** because the macro- and micro-perspectives are inextricably linked. Much of the outcome from changes in a population's age structure springs from its impact on the economy:

1. Investment Solutions are Needed for Pension Savings in East Asia

intergenerational transfers are very large and by the time a population has aged, much of its private wealth has become 'pension wealth' held by the older part of the population, either as income generating assets or as claims on future income through public and private transfers.

Thus, what matters is not how one age group behaves but how all age groups behave relative to each other, as a function of their wealth and size. Pension wealth plays a multidimensional role not limited to providing income to retirees but affecting all age groups in different ways.

Pension asset management matters not just to the elderly but to society at large, today and tomorrow.

1.1 The cost of population ageing and the need for investment solutions

When thinking about pension outcomes, consumption is the first order problem (Barr, 2006). Pension systems are designed to help support effective consumption levels after a certain age when labour income decreases or stops altogether if retirement is mandatory.

Achieving adequate real term purchasing power for the entire duration of an individual's period of retirement can be a complex problem and has been the object of substantial research into the design of pension schemes and pension systems.

However, recent advances in demographic research show that population ageing makes this phenomenon even more complex because what is typically considered as a given in the standard pension design problem i.e. the objective of smoothing consumption across an individual's lifecycle, becomes a moving target: the 'lifecycle deficit' of retirees [5] increases significantly at both the aggregate and per capita levels, as a population ages.

In other words, the larger the share of the elderly in a given population, the higher its total per capita consumption of public and private goods and services, especially healthcare and long-term care.

Hence, with population ageing, the lifecycle consumption profile of individuals is no longer smooth (i.e. flat) but upward sloping from around 65 years of age onwards and the per capita consumption of retirees eventually reaches levels above that of the working population as shown on figure 1 in the case of Japan over a period of only two decades.

If post-retirement consumption is privately financed by familial transfers and the product of retirement savings (both investment income and dis-savings) then the upward sloping consumption profile of retirees represents their long-term objective and should be explicitly taken into account when designing pension solutions.

Conversely, if old age consumption is financed via public transfers i.e. mostly from taxing the working population

5 - the difference between labour income and total consumption that must be financed by either transfers, debt, dissaving or asset income

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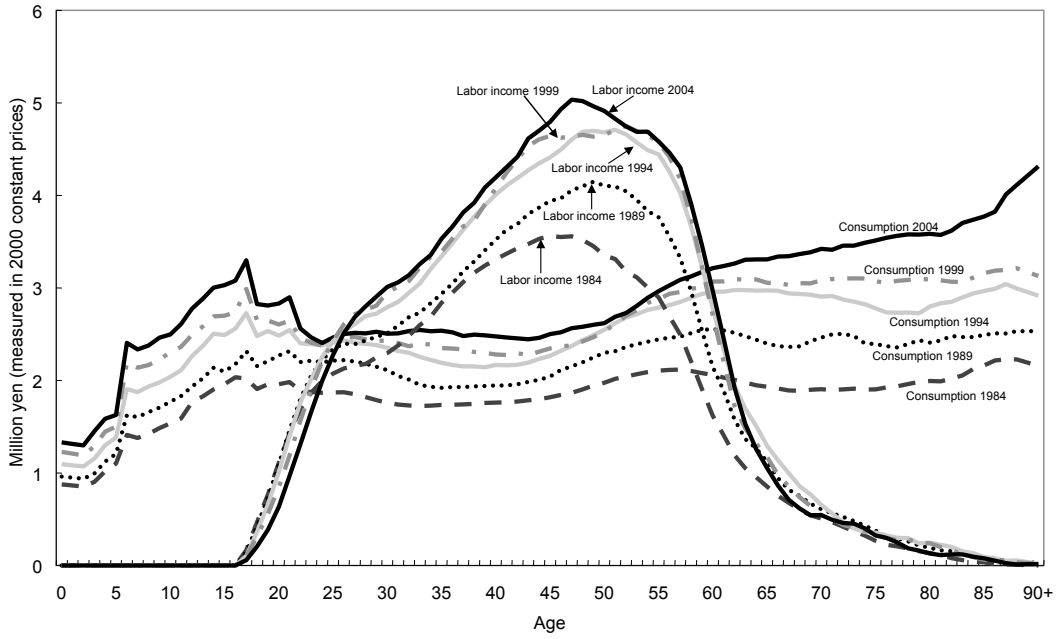
Figure 1: Per capita consumption and labour income profiles in Japan, 1984 to 2004, constant prices



Source: National Transfer Accounts, Lee and Mason (2011)

because it consists primarily of publicly provided healthcare and long-term care, then the impact on the ability of the cohort of current workers to save for its own retirement must be taken into account in its pension saving and investment strategy.

Moreover, as long as fertility remains below the replacement rate, population ageing continues and this effect is compounded for each new generation.

From an intergenerational perspective, with an increasing old-age liability and a shrinking workforce, these issues can be addressed by improving the level of savings (accumulation) as well as the investment income of these savings (asset management). And given East Asia's already high savings rates, most progress has to be made on the asset management side.

Pension asset management matters, because improving pension asset investment income should be pivotal to achieving adequate pension outcomes while maintaining fiscal stability.

Asset management research suggests that pension investment problems require specific investment solutions. Simply put, an investment solution allows for the optimisation of a given long-term objective function such as achieving target post-retirement levels of real consumption (or of purchasing power expressed in real terms), while respecting a given set of constraints, such as explicit funding ratios or drawdown limits.

1. Investment Solutions are Needed for Pension Savings in East Asia

1.2 Scientific investment management solutions

For funded pension systems to deliver levels of wealth in real term that are commensurate with post-retirement consumption objectives, scientific solutions identified in the literature recommend the combined implementation of three investment paradigms: Liability-driven investment or LDI, lifecycle investment or LCI, and risk control investment or RCI as defined in Cocquemas (2013):

- Pensions are long-term liabilities, which are in fact dynamic and depend on several time-varying factors. Pension solutions should therefore be designed in order to maximise the likelihood of meeting those liabilities at the horizon. This is the liability driven investing (LDI) framework.
- Furthermore, the horizon of the investor needs to be taken into account formally. As they approach retirement, plan members should be exposed to less risk. The strategy, notably the amount of risk taking, should be dynamic depending on the current wealth and future expected performance, and should explicitly consider the investment horizon. This life-cycle investing (LCI) dimension is therefore crucial to meet the needs of plan members.
- This strategy needs to be implemented while managing risk levels: there need to be short-term constraints too, which take into account the existence of a sponsor when there is one. These constraints can either be self-imposed or defined by the regulator. This is the risk-controlled investing (RCI) approach.

Hence, designing scientific pension solutions implies **well-defined consumption and wealth target levels as well as a high degree of clarity about explicit and implicit short term constraints**. In this context, the role of the regulator is to support the formulation of adequate and well-defined investment objectives and constraints and to create incentives for the management of funded pension systems in accordance with scientific prescriptions.

In numerous pension systems long-term objectives are ill-defined and short-term constraints are often not defined at all. Nevertheless, these two key dimensions of asset management remain implicitly in force: in the long-run, the consumption of retirees needs to be financed and in the short run, risk and loss aversion act like implicit short-term constraints on investment choices.

Without well-designed long-term objectives there cannot be any asset-liability management (ALM) and without explicit short-term constraints risk budgets are ignored.

Moreover, the ageing of a society is a non-linear, accelerating phenomenon, which means that the long-term is not adequately taken into account if assets are not managed dynamically.

In East Asia, the implementation of scientific investment solutions is particularly important because of the pace and magnitude of demographic change. If

1. Investment Solutions are Needed for Pension Savings in East Asia

adequate solutions are not put in place during the next decade there will be little time to adapt and avoid potentially disastrous outcomes.

1.3 The Challenges of designing pension solutions for East Asia

In the rest of this paper, we return to the issues highlighted above and examine the current management of East Asia's funded pension schemes. Section 2 discusses the major macro-level issues affecting funded pension schemes in East Asia.

It highlights the current absence of intermediation which characterises pension savings in the region and suggests two major challenges for the future of pension asset management in East Asia: an asset allocation challenge resulting in large part from the specific economic development model of the region, and a regulatory challenge to improve the design of existing pension systems and stimulate accumulation in dedicated pension assets.

Next, we review and assess the three categories of funded pension schemes in existence in the region.

Section 3 discusses the largest and most significant pool of pension assets: pension reserve funds. Section 4 reviews the role and design of corporate and occupational defined-benefit plans. Finally, section 5 examines the development of defined-contribution schemes and how they may be improved. Section 6 concludes.

Each of the five countries examined in this study is also the object of an annex, presenting a summary picture of the pension system, at the end of this paper.

2. Accumulation and Intermediation

2. Accumulation and Intermediation

In this section, we highlight the major macro-level issues affecting funded pension schemes in East Asia.

First, section 2.1 discusses the apparent puzzle characterising pension savings in the region i.e. their small size relative to aggregate savings.

In section 2.2, we review the demographic literature and highlight the impact of population ageing on the aggregate post-retirement liability to which several generations are exposed.

Section 2.2.4 focuses on the need to increase investment income to meet long-term consumption objectives while preserving fiscal stability.

Finally, sections 2.3 and 2.4 highlight the two major challenges faced by East Asia's pension systems: an investment challenge and a regulation challenge. We briefly discuss the investment challenge created by the development trajectory and policy choices that characterise the so-called 'Asian development model'.

The rest of this paper is dedicated to discussing the regulation challenge that East Asia's governments still have to address: ensuring that pension savings can be channeled towards adequate pension investment solutions.

2.1 The absence of intermediation

Under the classic lifecycle hypothesis, according to which individuals aim to smooth their consumption profile by varying periods of borrowing, savings and dissavings during their life, demographic transitions should coincide with an initial increase in aggregate savings as the workforce prepares to finance its consumption during retirement.

Hence an apparent puzzle: in East Asia, the demographic transition is in full swing and saving rates are amongst the highest in the world, but only a small proportion of savings is allocated to pensions schemes dedicated to meeting retirement income objectives.

2.1.1 Savings are high in East Asia...

The generally high level of domestic savings in East Asia has long been documented in the literature. Figure 2 shows that saving levels have been consistently above average in the region.

In a recent paper, Horioka and Terada-Hagiwara (2011) confirm this trend and the role of the demographic transition in explaining savings dynamics (See also Cole and Wright (1997) for an empirical test confirming the impact of the lifecycle hypothesis on saving rates in East Asia).

Japan's savings have decreased from their peak at 40% of GDP in the 1970s because it is more advanced in its demographic transition and has entered a period of lower savings at the aggregate level. Nevertheless, Japanese saving rates remain high by global standards.

China's particularly high savings rate is partly explained by the size of public sector

2. Accumulation and Intermediation

savings, as shown in figure 3, but Chinese household savings alone represent a larger share of GDP than total domestic savings in high income countries and more than twice total domestic savings in low income countries.

In Hong Kong and Korea, gross domestic savings exceed 30% of GDP, which is also high by global standards, especially when controlling for income levels.

2.1.2 ...but they are mostly held in cash...

Next, a very significant proportion of households' financial wealth in East Asia is held in cash or very liquid assets.

Cash hoarding is a particularly striking feature of the region. For example, domestic savings in China are mostly held in bank deposits and cash as shown in figure 7.

One interpretation is that Chinese households tend to hoard cash because they find themselves in a cash economy with little alternatives to save (low development of the financial system) and potential liquidity issues in the absence of a well-developed social safety net.

But in other parts of Asia, households hold just as much cash: in a financially advanced economy with an urbanised and educated population like Japan, the Bank of Japan estimates that households tend to hold significant amounts of cash (Sekine and Others, 2013). Indeed, Japanese households' financial assets consist of 55% of liquid assets like deposits and cash, as figure 4 illustrates. In comparison, pension and life insurance savings represent 25% of households' assets.

In the rest of East Asia, the same stable pattern in the financial asset holdings of households can be observed. Figures 5 and 6 detail the financial asset holdings of the household sector in Korea and Taiwan, respectively, during the previous decade. Cash and equivalent holdings in East Asia's household sector rarely fall below 50% while the sum total of life insurance and pension funds varies between 20 and 25%.

By way of comparison, US data collected by the Federal Reserve Board (not shown here) indicates that American households keep 16% of their financial assets in cash.

2.1.3 ...and pension assets are small.

The reserves of public pension systems in Japan, Korea, China and Taiwan represent the largest pool of retirement-related assets in East Asia. With no pay-as-you-go (PAYG) public pensions, Hong Kong is a notable exception.

These large public pension surpluses resulted from the rapid pace of demographic and economic transitions. In East Asia, infant mortality rates dropped extremely fast in the 1950s and the ensuing growth of birth rates led, 20 years later, to a continuous increase of the proportion of workers as a share of the total population. At that stage, the cost of public pensions was still low because the proportion of elderly dependents was small. Excess contributions created surpluses.

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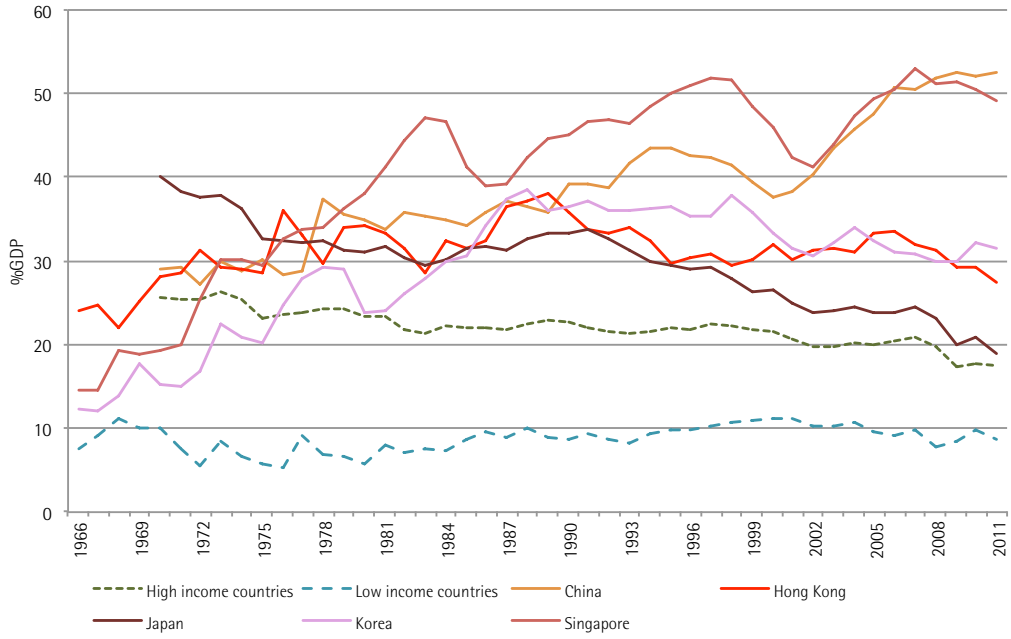
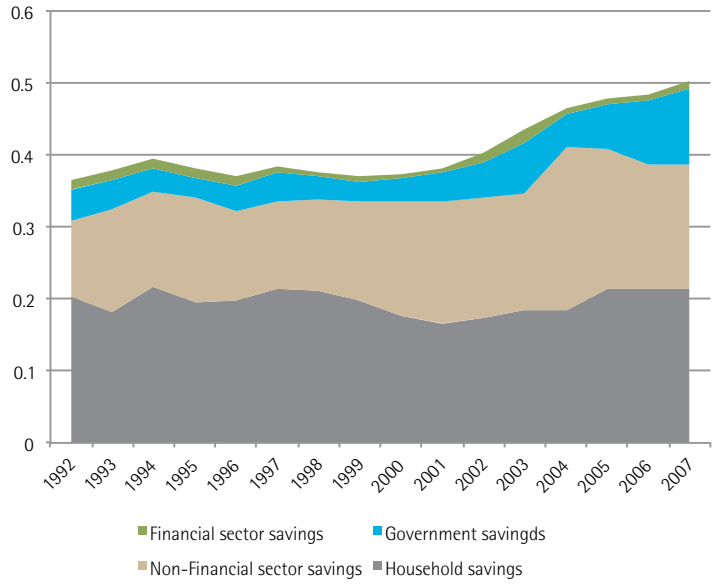
Figure 2: Gross domestic savings as a share of GDP, 1965-2011



Source: World Bank Development Indicators

Figure 3: Gross domestic savings by sector in China as a share of GDP, 1992-2007



Source: CEIC

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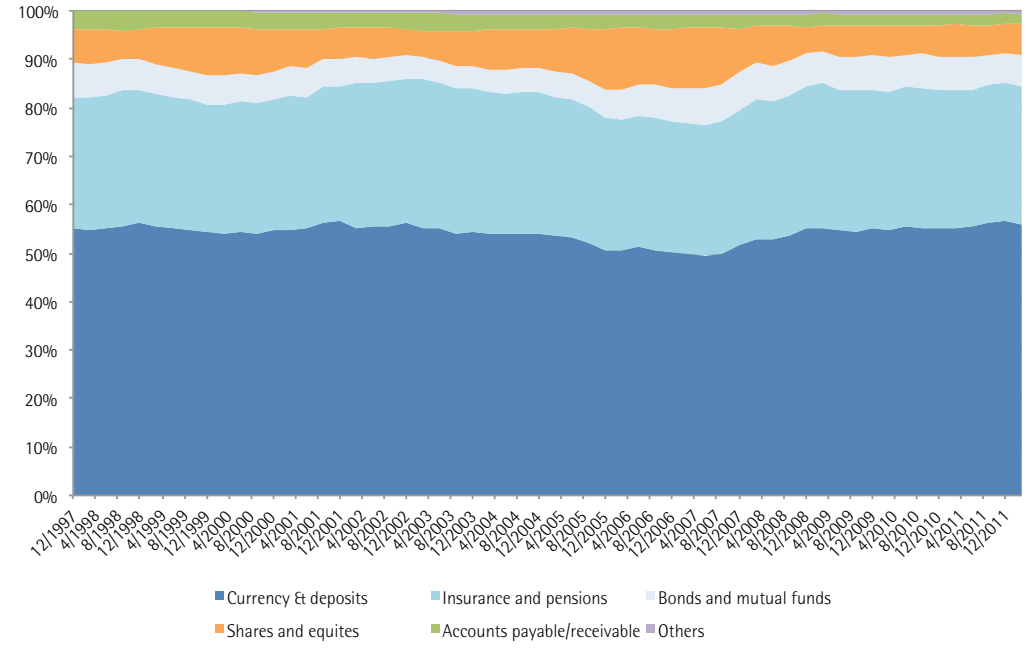
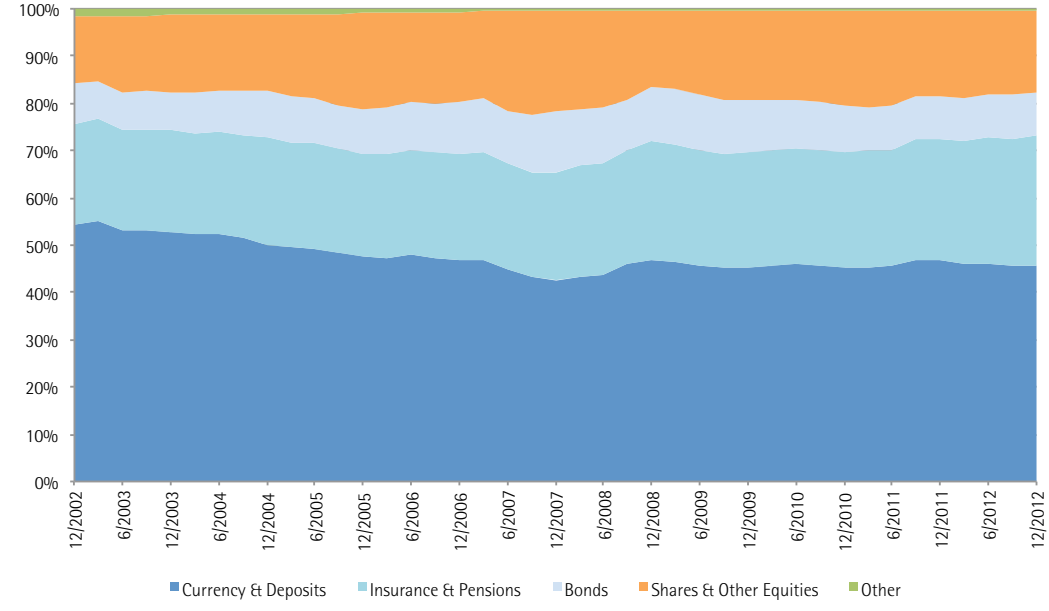
Figure 4: Household financial assets in Japan, 1992-2012



Source: Bank of Japan, flow of funds data

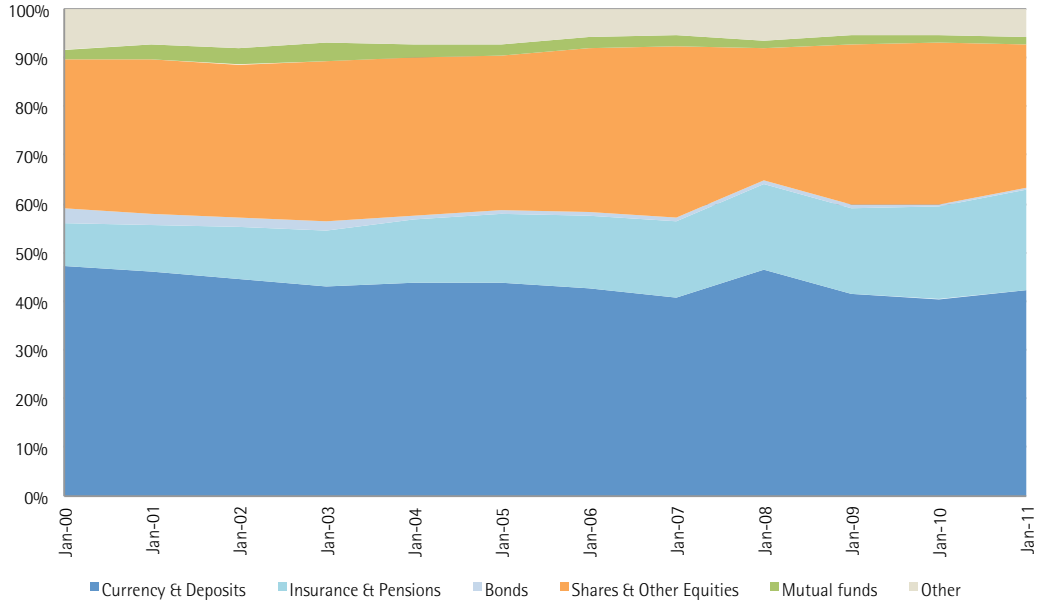
Figure 5: Household financial assets in Korea, 2002-2012



Source: Bank of Korea, flow of funds data

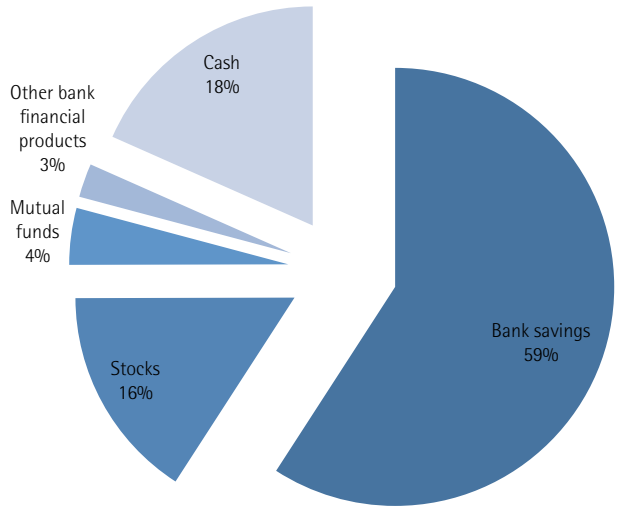
2. Accumulation and Intermediation

Figure 6: Household financial assets in Taiwan, 2000-2011



Source: Central Bank of the Republic of China, flow of funds data

Figure 7: Urban household financial assets in China, 2012



Source: Chinese Household Finance Survey, Gan (2012)

2. Accumulation and Intermediation

Japan's surplus peaked in 2004, but China, Korea and Taiwan are still accumulating reserves.

Thus, despite being PAYG systems, which are not designed to be funded, existing public pension systems in East Asia benefit from the opportunity to invest and manage significant reserves that can be used to help minimise the impact of ageing on the financial sustainability of public pensions.

Where they exist, these reserves can be large and represent a significant fraction of GDP as shown in figure 8.

However, pension reserves do not constitute the bulk of pension assets in the region because they are unusally large, but because other accumulation channels have not been created or have failed to function. Thus, private pension assets remain small.

Indeed, it is generally found that mandatory public pension contributions have crowded out private or supplementary schemes and little or no accumulation has happened in corporate or individual private plans in these countries.

As the example of Japan, going back several decades, suggests, as long as supplementary pension schemes remain voluntary for the employer, they tend to exist only in large firms and asset growth soon tails off. The decision to make supplementary pension schemes mandatory in Korea in 2011 is an attempt to address this issue.

In fact, in the absence of mandatory contributions, the historic failure to build up a sizeable private plan industry in an export-led economy like Japan could suggests that, in another export-driven economy, e.g. China, assets growth under the Enterprises Annuity scheme can be expected to tail off as well, until private pension are made mandatory. In other words, in a part of the world where wage competitiveness has not only been a key factor of economic success but also a cornerstone of economic development policy, enforcing mandatory private pension contributions was always going to be a second order priority.

Private pension assets accumulated in corporate and individual schemes thus amount to very little in these countries: 13% of GDP in Japan, 3% of GDP on Korea and 1% in China or about a third of existing pension assets in Japan, Taiwan and China, and less than 10% in Korea (see figure 9).

Again, Hong Kong, with a mandatory DC system, remains the exception with 100% private assets, corresponding to one third of GDP.

Thus, East Asia's households clearly have incentives to save but mostly not in dedicated pension schemes. It follows from this absence of intermediation of short-term household savings into long-term retirement income solutions, that future retirees face a substantial risk of inadequate retirement income and even poverty in old age, while the current workforce and the next generation face a non negligible risk of increasingly having to finance the

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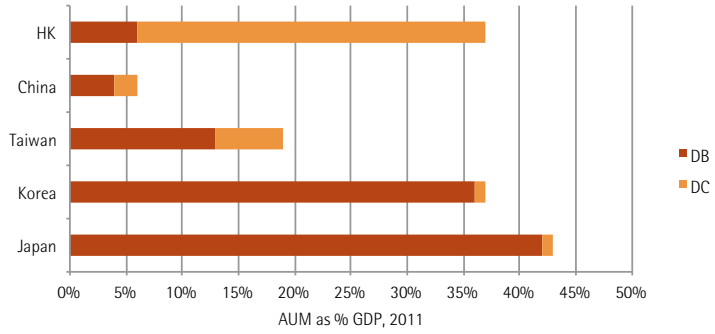
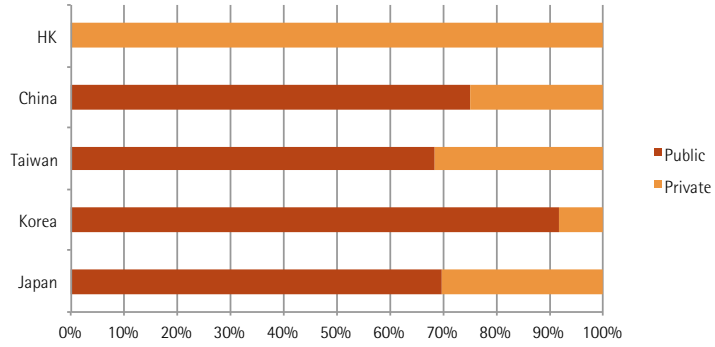
Figure 8: East Asia' pension assets as a share of GDP



Source: authors' computations

Figure 9: East Asia's pension assets by management responsibility



Source: authors' computations

consumption of retirees though increasing public and private transfers.

2.2 The demographic challenge

The absence of intermediation discussed above i.e. the fact that most individual savings in East Asia are not invested in dedicated pension funds or strategies, is all the more problematic when the need to finance old age consumption increases continuously.

Recent research shows that as populations age and economies develop, the total consumption of retirees, especially their consumption of healthcare, grows very rapidly, over and above consumption levels observed during their working life. If healthcare is mostly public and financed by taxing current workers, population ageing can thus impair the ability of the next generation to save for its own retirement.

Thus, while achieving post-retirement consumption objectives is the first order problem in pension solution design, population ageing creates a dynamic consumption objective at both aggregate and per capita levels, across several generations. This liability process is typically not taken into account in public policy and in the management of pension savings,

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including public pension or social security reserves.

Next, we review the impact of demographic change on population structure and savings (section 2.2.1), the consequential rise of lifecycle deficits (section 2.2.2) and the implications of these trends from the perspective of the management of pension savings (section 2.2.3).

2.2.1 Population ageing in East Asia

East Asia's demographic trends are well documented: an initial drop of infant mortality rates after World War II led to a baby boom, which was more or less rapidly followed by a steep fall in fertility, and, in the absence of substantial immigration of working age individuals, a gradual shift of the age distribution of populations to the right. (see Lee and Mason, 2011, for a review).

Average age increases but the shape of the age distribution also shifts and the relative share of older individuals rises as figures 10 and 11 illustrate for Japan and China. **This phenomenon is known as population ageing**.

As long as populations do not age, retirement is unproblematic. In hunter-gatherer societies, life expectancy is short and the oldest members of society can expect to benefit from familial and community support. With human and economic development, longevity increases, as does the number of elderly, while industrialisation and urbanisation tend to strain or minimise familial support. Hence, the phenomenon that led to development and wealth creation also creates the problem of retirement.

While it is more frequently discussed than fertility issues in the pension literature, longevity is only an aggravating factor. Whether longevity continues to increase linearly for a long time (see for example Oeppen and Vaupel, 2002) or average life expectancy after retirement eventually tails off [6], **as long as fertility and immigration are low, population ageing continues indefinitely**.

In East Asia, fertility rates have been consistently and durably below the population replacement rate. The region is experiencing the most rapid demographic transition in history and, as a consequence, the impact of population ageing is expected to be the most severe in this region, as well some parts of Southern Europe.

If Japan is any indication of the future demographic trajectory of the rest of East Asia, as the demographic literature strongly suggests [7] , fertility will stay low in the region for a long time. Hence, **population ageing will continue in East Asia** for the foreseeable future.

With population ageing, the workforce and, about 20 years later, the total population must shrink. Figure 12 shows that Japan's population peaked in 2008 and is forecast to return to its early1970s level by 2050. Likewise, the population of Taiwan is expected to peak in 2022 and to have returned to its 1989 level by 2050. Hong

6 - Olshansky et al. (2005, argue that increasing obesity will have this effect in North America)

7 - Since the 1990s at least, demographic studies have been able to rely on robust models of population change that have only been confirmed by more recent data. The demographic transition observed in advanced and developing economies is so systematic and regular that it can be treated as a matter of quasi certainty (see Mason et al., 2010, for a review).

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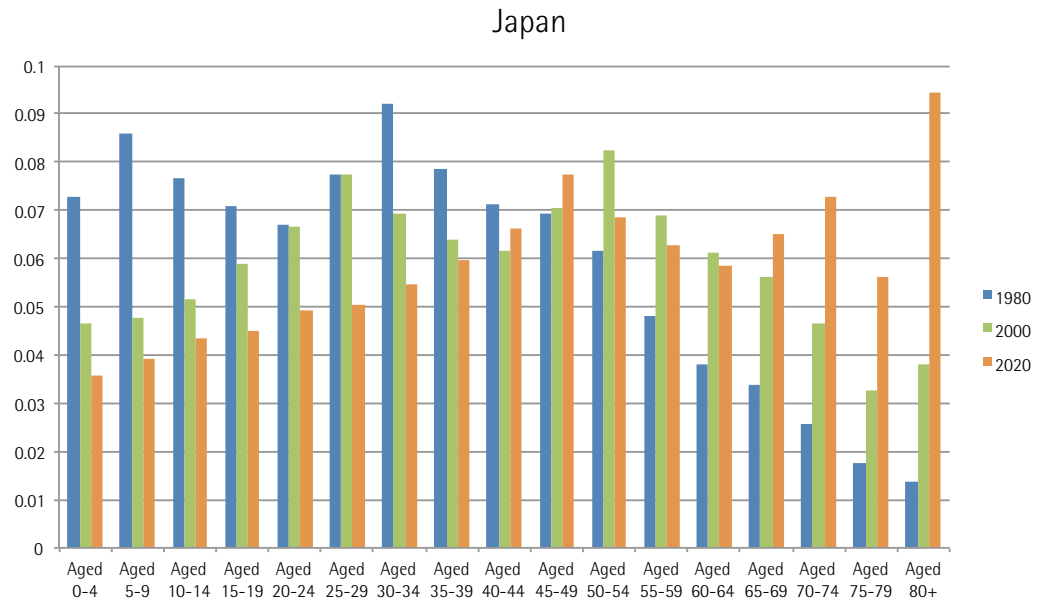
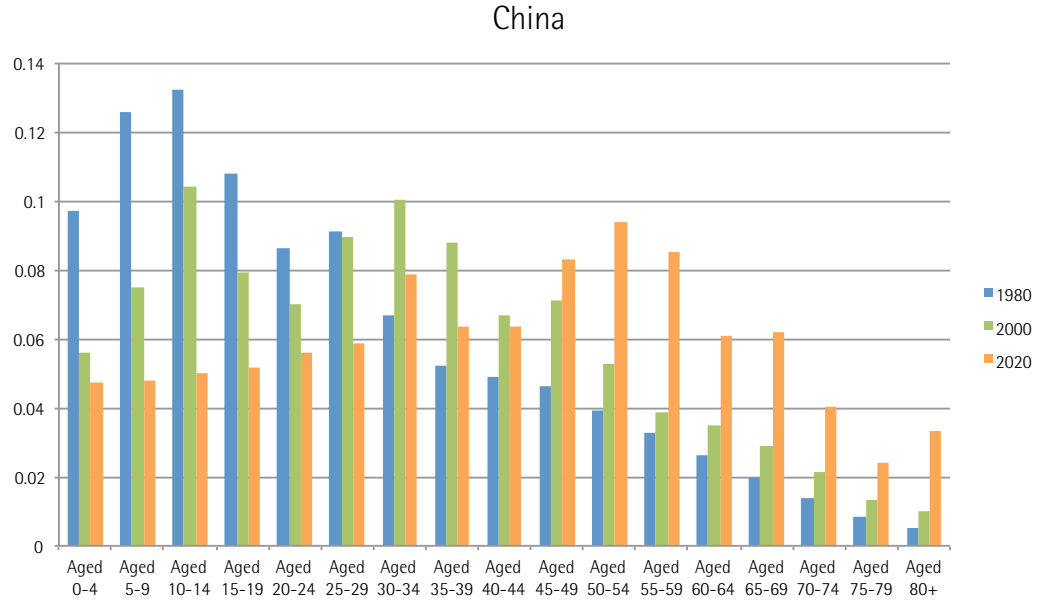
Figure 10: Population distribution in Japan in 1980, 2000 and 2020



Source: UN Statistics

Figure 11: Population distribution in China in 1980, 2000 and 2020



Source: UN Statistics

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Kong's population will peak in 2025 and have returned to its mid-90s level by 2050. The population of Korea peaks in 2023 and is expected to have returned to its 1991 level in 2050. Finally, the population of China is expected to peak in 2026 and by 2050 to have decreased back to its 2006 level.

From low fertility to high dependency

Coale and Hoover (1958) created the notion of `dependency rate' in a context where the burden of a large young population on growth was the primary concern against a backdrop of low savings, low investment and slow human capital development. Indeed, dependency ratios, which represent the relative weight of the inactive share of the population (below 15 and above 65) to the active share (15-65) increased in East Asia in the 1960s and 70s, during the first phase of the demographic transition. Japan also experienced a so-called baby boom `echo' in the 1970s.

From relatively high levels after World War II, birth rates have been falling continuously, leading to lower dependency ratios as the bulk of the population became part of the work force. Despite continuously lower birth rates and increasing death rates driven by the larger relative size of the older segment of society, the effect of ageing leads to a reversal of the trend in the dependency ratio.

Japan leads this change and also prefigures change in other East Asian countries. It is twenty years ahead compared to the rest of East Asia. It entered the ageing phase of its demographic transition in the late 1990s, whereas the rest of Asia is entering it during the early 2010s. In 1991, Japan's dependency ratio bottomed out and is expected to have returned to its 1950s equivalent by 2020, this time because of the share of the population aged 65+. The dependency ratios of other East Asian countries follow the same trend 20 years later: Hong Kong's dependency ratio reverses its course in 2010, China's in 2011, Korea's in 2012 and Taiwan's in 2014.

Figure 13 plots East Asia's dependency ratios against GDP per capita (at purchasing power parity and in constant USD). The trend towards higher dependency ratios is a function of each country's demographic and economic trajectory. East Asia's dependency ratios reverse their course between USD20,000 and USD40,000 of GDP per capita, except in China's case where dependency started to rise as soon as GPD per capita reached USD8,000, highlighting the specific challenge of financing dependency in this country, since the ability of individuals to save and contribute to a pension and social system is all the more limited.

Countries that can accommodate some immigration, like Hong Kong or Taiwan, can increase the size of their workforce by promoting the resettlement of foreign labour to manage their demographic predicament. However, such immigration policies can be controversial. In countries like Japan, Korea and China are structurally incapable of receiving a large net inflow of migrants, ongoing and accelerating

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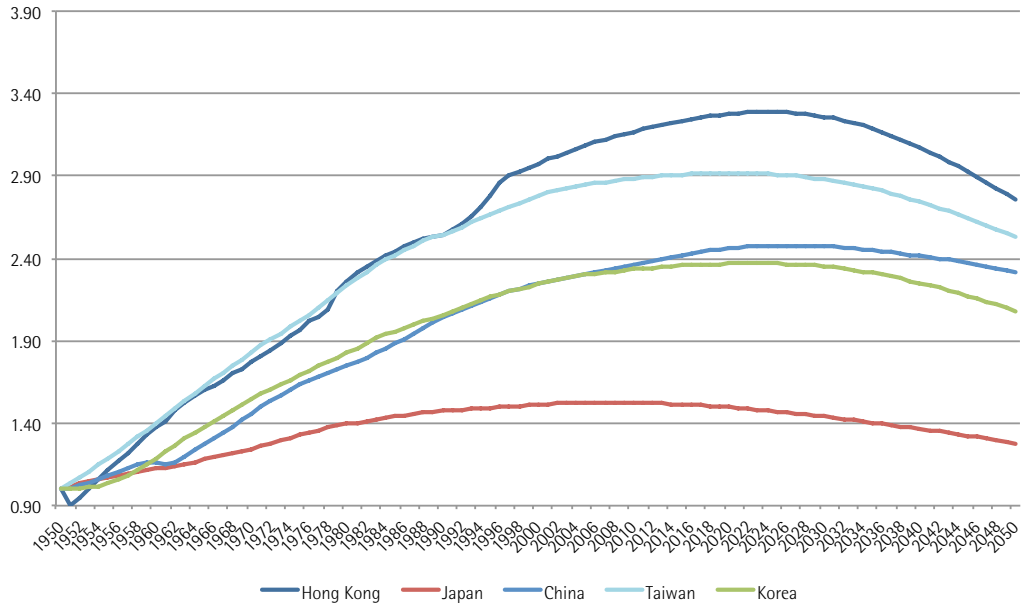
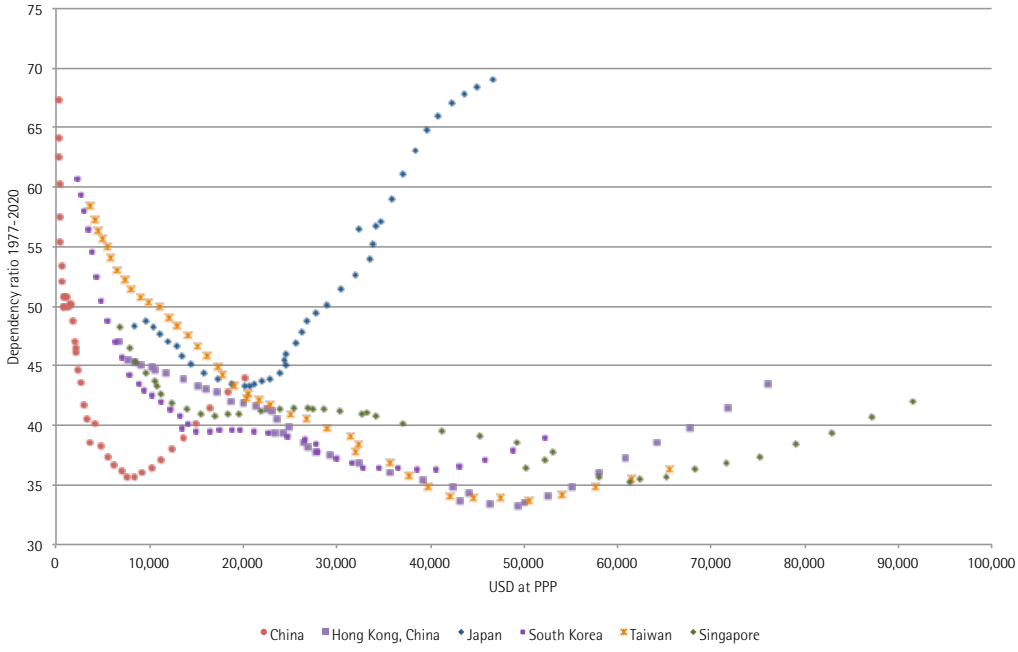
Figure 12: Total population trajectories in East Asia 1950-2050, 1950=1



Source: UN Statistics, authors' computations

Figure 13: Dependency ratios and GDP per capita, constant USD at purchasing power parity, 1977-2020



Source: World Bank, UN Statistics, authors' computations

2. Accumulation and Intermediation

population ageing creates a much more urgent and unavoidable problem. Together, these countries represented 95% of East Asia's GDP and 98% of its population in 2011.

The reversal of the first demographic dividend

During a demographic transition, the workforce first grows faster than the total population resulting in a mechanical growth of output per capita, even if labour productivity does not increase. This is known as the **first demographic dividend** (see Lee and Mason, 2011, for a discussion).

The first demographic dividend arises because the population is concentrated in ages during which production exceeds consumption and the growth rate of the number of effective producers exceeds that of the number of effective consumers.

For these reasons, this effect can only be transitory and eventually turns negative i.e. continued population ageing leads to the reversal of the first demographic dividend. As the demographic transition unfolds, the workforce stops growing and eventually begins to shrink, the ratio of consumers to producers reverses its trend and the demographic dividend becomes a drag on output growth: each worker has to be more productive to generate the same amount of output per capita.

Furthermore, this `pure demographic effect' is difficult to offset. One set of policies already promoted in Japan aims to have individuals work longer to partly minimise the effect of ageing. Bloom and Williamson (1998) argue that this is unlikely to work if the rest of the world is any guide: as incomes rise, people tend to work less hard, spend longer in schooling and while the whole population cannot afford to retire early, a significant proportion can and will, making the prospect of other forces offsetting the demographic effect unlikely.

In East Asia, the first demographic dividend has paid off handsomely as is well documented in the literature. But the pace of the demographic transition has been such that the impact of population ageing has already begun to appear in Japan and will do so in less than two decades in Korea, China, Hong Kong and Taiwan: Bloom and Williamson (1998) estimate the `growth retardation' impact to be between 1 and 2 percentage point of annual GDP growth in these countries. Looking at a global sample, Lee and Mason (2010) calculate that the largest declines in wealth by 2050 will occur in South Korea, Japan and Taiwan with a drop of per capita consumption of more than 20%.

Savings and demography: Is there a second demographic dividend?

Some authors argue that the same demographic forces that put an end to the first demographic dividend may lead to a `second demographic dividend' (Lee and Mason, 2011): the consequence of the accumulation of savings resulting from the initial rapid increase of the proportion of workers in the total population.

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Assuming a dynamically efficient economy, higher savings should translate into higher investment per worker. This `capital deepening' (higher capital investment per unit of labour) should also lead to higher labour productivity. This transmission channel is particularly important once population ageing has begun and the workforce has started to shrink. Here, the savings of retirees are expected to support labour productivity growth and offset the reversal of the first demographic dividend described above (Lee and Mason, 2011).

The increase of savings rates with demographic transitions and the corollary impact of growth are also well-documented. Higgins and Williamson (1996) and Higgins and Williamson (1997) show that East Asia's savings rate was 8.4 percentage points above its 1950-92 average in the early 1990s due to a much lower dependency ratio. Conversely, in the mid 70s, it was 5.2 percentage points below its 1950-02 average due to a high dependency burden during this period.

Higgins and Williamson also find a total demographic-driven swing in savings rates of 13.6 percentage points, or almost all the total rise in East Asia's savings rate over the considered period. This analysis of the relationship between saving rates and demographic transition has been tested and confirmed in a number of papers, especially in the case of Asia.

The same strand of literature also finds a relationship between demographic growth and investment: demographic transition through its impact on savings is estimated to have raised significantly the share of investment. Higgins and Williamson (1997) find that this effect accounts for 1 percentage point of the growth in GDP per capita in East Asia.

Hence, together with the growth of labour inputs per capita, it can be argued that the effect of demographic transition explains most of East Asia's economic growth, controlling for institutions and public policy, in particular the opportunity to employ productively the cohort of baby boomers (see Page, 1994, for a discussion of the East Asia `economic miracle').

Still, for the last stage of demographic transition to yield a new dividend as proposed by Lee and Mason (2011), **much depends on the uses that are made of the accumulated savings, including pension assets**.

The demographic literature typically assumes that retirement savings will be channeled into efficient, productive and sustainable endeavours. However, If, for example, most pension savings are invested in government bonds, the proceeds of which are used to support increasingly expensive public healthcare and long-term care programs for the elderly, the link between pension savings and long-term growth can seem tenuous at best.

Thus, the investment and the management of the large pools of savings that now exist in East Asia have potentially far-reaching consequences on the outcome

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of population ageing and this is partly a function of the type of pension schemes that are made available for current workers and retirees.

Next, we review recent empirical results on the evolution of the consumption profile of an ageing population and how what is effectively a dynamic long-term liability impacts the retirement saving behaviour of several generations.

2.2.2 Ageing and increasing lifecyle deficits

The lifecycle hypothesis postulates that variations in productivity during individuals' lives lead them to vary their savings over their lifetime in order to smooth the profile of their consumption (Fisher, 1930). Hence, the literature typically argues that if lifecycle savings are dominated by pension motives, slower population growth should lead to lower aggregate savings (Modigliani and Ando, 1957), but if lifecycle savings are mostly required to finance childrearing, slower population growth should lead to increased saving (Coale and Hoover, 1958).

Thus, under the pure lifecycle saving hypothesis (no bequest motive), aggregate saving rates decline during the stage of the demographic transition during which fertility is high but infant mortality has dropped. They rise considerably during the next stage, when fertility also drops and the population of adult workers is the largest. Finally, they are expected to decline again with population ageing (Lee et al., 1997). Most pension models and policies revolve around this idea.

However, recent empirical research provides contradictory evidence.

The National Transfer Accounts

Lee and Mason (2011) argue that ageing leads to an increase in the demand for `lifecycle wealth': claims on future output to provide for income in retirement, which mostly take the form of capital or transfers.

Capital involves owning assets either directly or through pension funds. Transfer wealth is the present value of the difference between the transfers one expects to receive in the future, and the transfers one expects to make, both public (taxes and social benefits including PAYG pensions) and private (donations, familial support, etc.).

The National Transfer Account project (NTA) initiated by Lee and Mason (2011) helps document the evolution of lifecycle wealth in human societies.

The lifecycle deficit (LCD) of any age group is the difference between all private and public consumption (of publicly provided goods and services) and all labour income from the formal sector including self employment and social benefits and contributions made by employers, before any taxes. The per capita labour income and consumption profiles by year of age of Japan, Korea, Taiwan and China are shown in figure 14

The NTA flow identity below states that the difference between consumption and labour income or lifecycle deficit (LCD) is always equal to net transfers (public and

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private) plus the difference between asset income and savings.

For each year of age *t*, inflows (labour income, transfers and asset income) must be matched by outflows (consumption, transfers and savings) and by construction, LCDs are funded by net private and public transfers and by asset income or debt. [8]

$$LCD_t = \text{consumption}_t - \text{labour income}_t = \text{net transfers}_t + (\text{asset income}_t - \text{savings}_t)$$

The NTA data covers 23 countries varying in level of development from Kenya to the US for individual years between 1984 and 2006. Looking at individual country profiles for relevant years, the following stylised facts can be drawn:

- The surplus generated from the workforce's labour income (the area above the red line and below the green line on figure 14) is usually less than the combined lifecycle deficits of dependents, the young and the elderly (the two areas below the red line and above the green one). China and Kenya are the only two exceptions in the sample due to very low consumption profiles.
- At the aggregate level, transfers cancel each other out, and asset income – either positive if it is the product of invested assets, or negative if debt is used – is necessary to fill in the gap.
- There is a very strong, linear relationship between the lifecycle surplus of the workforce and GDP per capita as shown on figure 15. This is to be expected since higher GDP typically implies higher labour productivity.
- However, figure 15 also shows a very strong linear relationship between GDP per capita and the combined lifecycle deficit of the younger and older segments of the population. This deficit grows roughly three times faster than the corresponding surplus as a function of each economy's GDP per capita.

NTA data thus suggests a clear `lifecycle deficit path' as individual countries move up the GDP per capita scale. The existence of this path is also confirmed by NTA data available on a time series basis in the case of Japan (see figure 1 in section 1, NTA data for Japan spans 20 years). Lee and Mason (2011) argue that the evolution of the lifecycle deficit profile of a society can be modelled from hunter-gatherer societies to contemporary post-industrial ones.

The reversal of intergenerational flows

NTA data and literature also yields other important insights relative to the impact of population ageing on long-term consumption objectives.

Much higher lifecycle deficit of the elderly

- The lifecycle deficit of the elderly is a relatively recent phenomenon since they are found to be productive until their 70s in the traditional societies. However, in contemporary societies, independently of the relative level of development, the older segment of society has the ability to draw on resources that are higher than

8 - Public transfers are divided between public inflows correspond to publicly provided programs and public outflows to taxes. Negative net public transfers or public dissaving corresponds to public debt. Private transfers can occur between or within households, including by firms or NGOs. Private asset income includes the return from financial and other assets as well as imputed rents. Public asset income includes the return on publicly owned assets and the service of public debt (a negative). Asset income (inflow) is offset by any new savings (outflow); new debt is recorded as negative asset income (outflow) and dissaving as an inflow. Per capita flows are estimated using age profiles derived from national surveys and made to add up to national aggregates. Survey data allows the allocation of public expenditure on healthcare and education public expenditures by age. Other public flows are considered constant for each age group. Private consumption is allocated by age in a similar way using household survey data. Aggregate flows at each age are calculated as the product of per capita flows and the population at each age.

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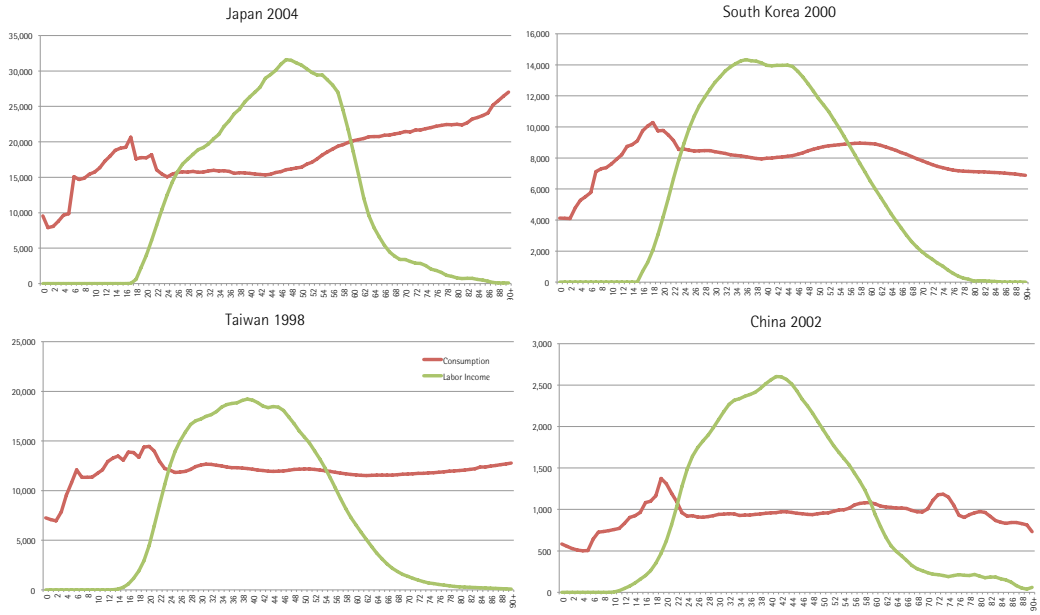
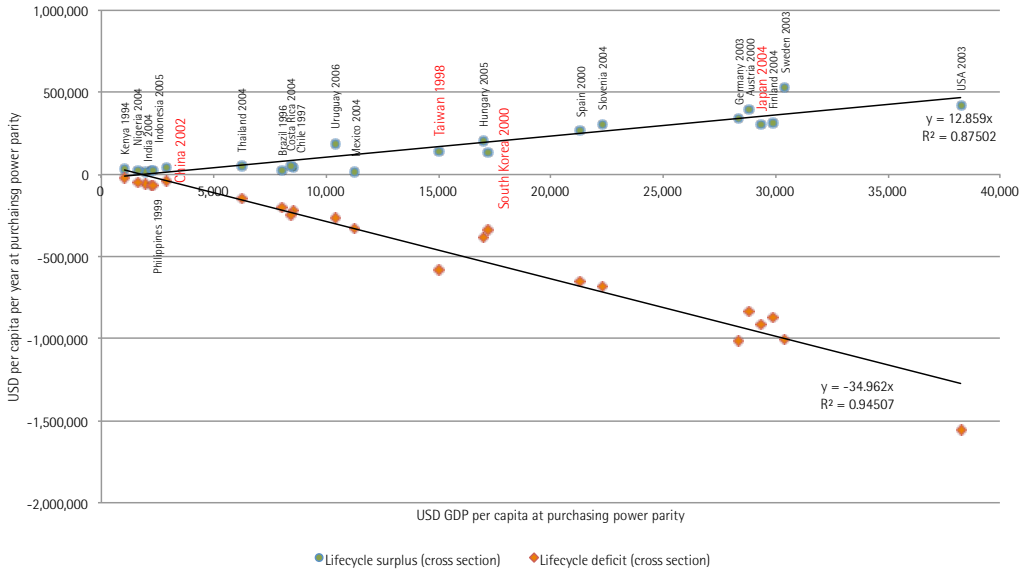
Figure 14: Per capita lifecycle consumption and labour income profiles in East Asia, constant USD at purchasing power parity, cross-section for relevant years



Source: Lee and Mason (2011)

Figure 15: Cumulative per capita lifecycle deficits and surpluses vs. GDP per capita (constant USD at PPP)



Source: Lee and Mason (2011), World Bank Development Indicators, authors' computations

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what they can earn through their labour. In all NTA countries, a lifecycle deficit appears from age 65 and is common (75% of cases) by age 55.

- As populations age and become richer, the per capita consumption of the elderly, including their consumption of public services like healthcare, rises above the per capita consumption of the workforce. This partly invalidates the notion of `replacement rate' since the total consumption needs of the elderly are shown to be much higher than that of the workforce.
- In most countries, the majority of the lifecycle deficit of the elderly is driven by healthcare costs and the majority of these costs are financed by public flows.
- In Asia, net private transfers to the elderly have decreased significantly in Japan, Korea and Taiwan. In Japan, *in vivo* private transfers from the elderly back to their children are growing and net private transfers are nil.

Sources of financing of the elderly's lifecycle deficit

- In the US, asset income (including pension plans) finances most of the lifecycle deficit of retirees, as figure 17 illustrates.
- In Asia, net private and public transfers are found to be much higher and represent as much as one third each of the population's lifecycle deficit in Taiwan and Korea.
- In East Asia, as opposed to the US, the elderly are not dissaving but instead continue to accumulate as figure 16 shows.
- Figure16 also shows that the oldest elderly people have less assets because they started accumulating later and from a low base, but the next generation of retirees has accumulated significant savings.

Ageing also leads to a higher lifecycle deficit for the young

- Lee and Mason (2011) report a strong trade-off between fertility and human capital spending. Hence, ageing tends to be accompanied by higher investment in future labour productivity.
- Despite lower fertility and absolute number of birth, population ageing is also accompanied by an increase in the lifecycle deficits of the young: total consumption per child is low in countries with high fertility and high in countries with low fertility especially in East Asia (South Korea, Japan or Taiwan). While Japan and Germany have the same level of fertility, Japan's consumption per child is 22% higher than Germany's (Lee et al 2010:18).
- China is the exception with very low consumption per child despite low fertility because of low levels of consumption at all ages. One third on average of Children's consumption is public consumption.
- The lifecycle deficit of the young is partly driven by higher healthcare costs for infants and mostly by higher education costs for children and young adults.

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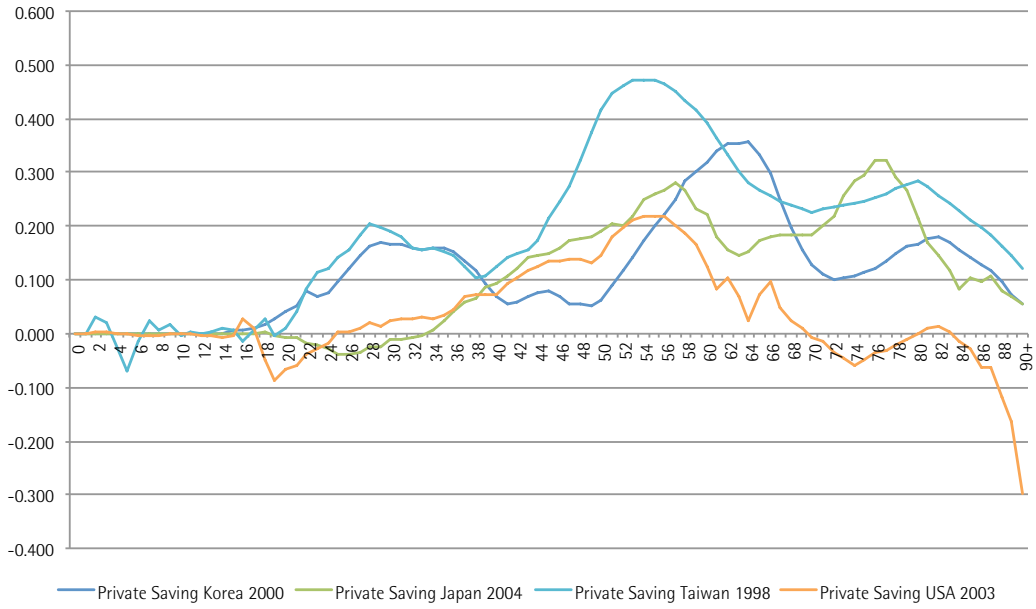
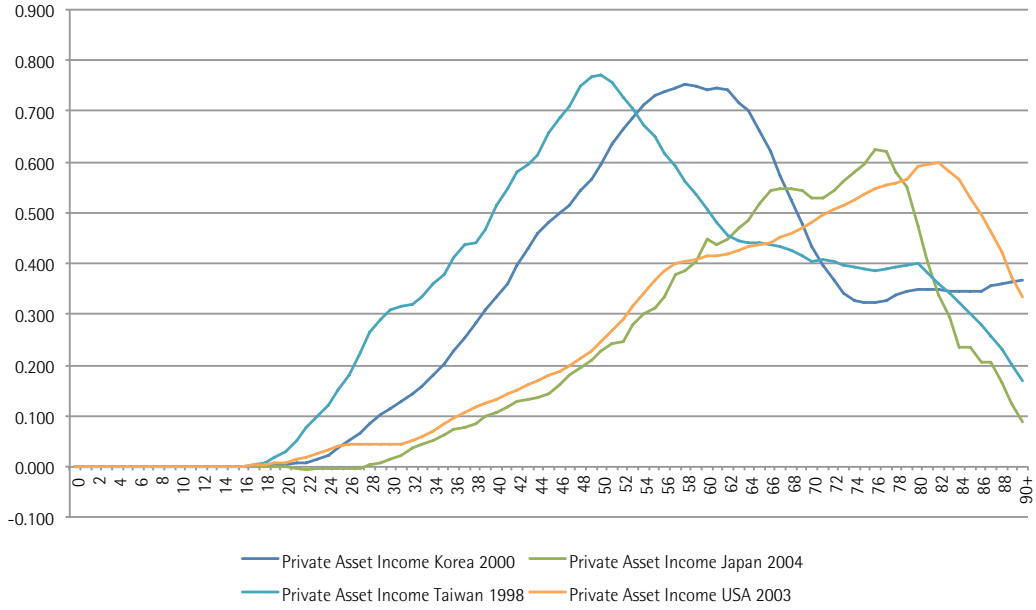
Figure 16: Per capita private savings (flow) across the lifecycle (normalised by the average of labor income for individuals 30-49 years old)



Source: Lee and Mason (2011)

Figure 17: Per capita asset income (flow) across the lifecycle (normalised by the average of labor income for individuals 30-49 years old)



Source: Lee and Mason (2011)

2. Accumulation and Intermediation

- Most of the increased cost of education and healthcare for infants, children and young adults is borne by the public sector but with some regional variations in the case of education.
- The public share of children's consumption of education ranges from 70% in the US to 96% in Sweden. However, East Asian households finance a substantial proportion of the investment made in educating their children: up to half of the education expenditures of young Asians is borne by their families.

Lower labour force participation

- As the point above suggests, population ageing is also accompanied by a later entry in the workforce of the younger part of the population i.e. the average year of age at which individuals begin to generate a lifecycle surplus tends to rise.
- However, the age beyond which individuals begin to show a lifecycle deficit again does not advance much in most countries due to a certain rigidity of the retirement age.
- Hence, both the aggregate and average (per capita) lifecycle surpluses tend to shrink as the aggregate and per capita lifecycle deficits tend to grow.

The role of savings

- The lifecycle hypothesis is invalidated in most countries: the older part of the population continues to accumulate private savings long after retirement. The USA is a notable exception.
- It seems reasonable to posit that individuals do not dis-save because they do not have to i.e. public transfers cover the majority of their costs, especially healthcare costs.

The role of public flows

- By far the largest share of intergenerational transfers are mediated through public flows i.e. taxation, mostly the taxation of labour income.
- This creates a strong link between the accumulation behaviour of different generations.

Lee and Mason (2010) argue that while intergenerational transfer have historically flowed from older to younger generations, as current generations passed and invested their resources in future ones, this trend can be reversed with population ageing: current generations use transfer systems, especially public ones, to claim the resources of future generations.

In Asia, Mason et al. (2010) find that Taiwanese, Chinese and Korean net total flows are still going downward but those of Japan have already been reversed - one of the few such cases, along with Germany, Austria, Slovenia and Hungary. They show that this shift is driven entirely by the change in the population age structure.

2.2.3 Implications of rising lifecycle deficits

Some key findings for the NTA project challenge two important hypotheses used in

2. Accumulation and Intermediation

the pure lifecycle model, which underpins so much pension thinking:

- **No more consumption smoothing**: in younger and poorer populations, the per capita consumption profile of the elderly is lower than that of the workforce. As the economy develops and life expectancy increases, the age consumption profile becomes flat across the lifecycle, but eventually the per capita consumption of the elderly becomes the highest of the population if both public and private consumption are taken into account.
  This suggests that the objective of pension savings may have little to do with consumption smoothing. If the majority of old age consumption is public healthcare financed by taxing the workforce (i.e. the next generation) then assuming no free-riding between generations, a pool of several generations could consider this consumption objective to be its liability target. If, on the contrary, the majority of old-age healthcare consumption is privately financed, then it is a liability for each generation of retirees and should be part of its post-retirement consumption objectives, with important implications for pension savings investment choices.
- **Retirees do not dis-save**: in most countries in the world (where healthcare is mostly financed by public transfers), there is currently no evidence of dissavings in old age: current retirees have continued to have positive net savings and to accumulate financial assets after they have retired, while the workforce supports most of the increasing healthcare costs of old age as well as the increasing education costs of young age.
  The only clearly documented case of old age dissaving is found in the U.S. In the rest of the world, *current* retirees are not particularly at risk because they receive substantial public transfers and thus can also continue to accumulate.

Thus, both at the individual and at the aggregate level, **population ageing, combined with higher wealth per capita, creates a predictable and increasing liability process** defined as the per capita consumption in each post-retirement year, as well as in each pre-work year. In most countries, this liability is mostly the result of the increasing cost of education and healthcare per capita that is concomitant with population ageing. This liability is both that of the nation and of each individual across several generations.

Instead of invalidating the lifecycle model, these findings suggest that the existence of generous public pensions and social security creates *a generational lag* in the need for individuals to adapt their savings and consumption behaviour, as a function of their ability to generate an income.

The current generation would thus be benefiting from exceptionally favourable circumstances and the necessary adaptation to the impact of demographic change may have to be borne entirely by following generations.

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Importantly, this outcome has so far removed much incentive for retirees to invest their pension savings in order to meet their effective consumption level since most of this consumption is not financed by their savings. If, as the NTA data shows, **current retirees do not need on average to dis-save, then even the most conservative allocation of their pension savings is sufficient. This, in turn, has considerably lowered the demand for optimal investment solutions so far**.

Moreover, the liability represented by the rising lifecycle deficit of the elderly, whether it is their own or that of the current workforce/taxpayers, or both, is thus **not explicitly taken into account in the planning and management of pensions savings**, especially public pension reserves or the next generation of retirees.

2.2.4 The role of asset income

It remains that this liability must de financed. Three sources of funds can be envisaged:

1. Transfers
   a) private transfers mostly within families from workers to dependents
   b) and public transfers through taxation (mostly of the workforce)
2. Debt, mostly public debt i.e. taxation of the next generation of workers
3. Asset income (public or private), mostly through the accumulation and successful investment of private savings.

In other words, much relies on the current workforce and its savings and investment options and decisions.

> "If standards of living are to be sustained, the working-age population must generate sufficient resources to fulfil three important responsibilities. The first is to provide for its own material needs, the second is to fund public and private transfers to children and the elderly, and the third is to save enough to fund its own future retirement needs. The standards of living *of all* depend on the success with which the working-age population meets these challenges."(Lee and Mason, 2011, emphasis added)

In this respect, East Asia benefits from two significant advantages compared with the rest of the world

- The role of **non-financial private transfers** while it is shown to be decreasing, remains significant and cushions the public sector from a significant proportion of the costs related to ageing (e.g. in 2012, 20% of Japanese households still have three generations under the same roof, against 1% in France)
- The ability to minimise or completely avoid international capital markets to raise public debt insulates the government from market perceptions

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of sovereign credit risk and allows for a *much more extensive use of public debt issuance* to finance lifecycle deficits without incurring higher financing costs. This situation of an ever increasing lifecycle deficit financed by public debt is exactly what can be observed in Japan with a very high debt/GDP ratio.

In other words, East Asia's economies can seemingly sustain much higher levels of lifecycle deficits than economies which have little private transfers and a limited borrowing capacity in international capital market or domestically.

But there is also a limit to this position: financing lifecycle deficits with public debt while keeping all public debt domestically held necessarily means imposing the absorption of this debt by the local financial sector, in particular, deposit banks, insurers and pension funds.

The more low-yielding debt the government imposes to financial institutions, including pension funds, the lower the level of asset income for these investors, the more the government has to plug the gap of public pensions and healthcare by issuing more public debt.

Likewise, in order to minimise its cost of financing lifecycle deficits, the public sector can keep interest rates below market clearing levels (see section 2.3.1 on financial repression in East Asia) but this also amounts to minimising private asset income, thereby furthering the need to finance deficits with more public debt.

The way out of this vicious circle, which Japan illustrates all too well, is to **increase asset income instead of increasing public debt**.

Mason (2005) address this issue for East Asia through simulation and show that there is a trade-off between transfers and assets.

For a low level of transfers (defined as 35% of old age consumption financed by public and private transfers) they estimate that assets held by households need to rise to seven times labour income by 2050 assuming open capital markets and the possibility of investing abroad. For 65% transfers, the asset accumulation level is only twice labour income.

But Lee and Mason (2010) argue that if this pension wealth is not held in assets but in transfers it will not spur growth but instead limit it.

2.2.5 The need for investment income

Assuming there are limits to the level of inter-generational transfers and the alternative use of public debt to finance lifecycle deficits, asset income is an essential part of the solution to financing the current and future consumption of an ageing society.

Increasing asset income implies either increasing accumulation, or investment income, or both. But as we have argued above, accumulation is already at historic highs in the region and in the history of the world economy. Likewise, the level of effective public indebtedness is already high, as China's recent sovereign rating

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downgrade suggests. It follows that the fundamental issue is one of intermediation.

In turn, increasing investment income to meet current and future consumption objectives raises two more challenges in East Asia:

- An investment challenge: asset allocation
- A regulation challenge: improving the design of pension plans to attract private savings and deliver adequate solutions.

In the next section (2.3), we briefly discuss the first challenge before focusing on the second challenge in the rest of this paper.

2.3 The investment challenge

The macroeconomic context in which the investment of pension savings must take place is specific to the region. East Asia's economies have grown according to a model that has favoured exports and investment and has led to well-documented and enduring distortions of economic and financial systems.

While the so-called East Asian economic development model has been extremely successful at delivering fast growth and development in the region, in the long run, which is the relevant horizon for pension investment, the distortions that have been introduced in the economy can become very difficult to reverse. These structural financial imbalances can then make the investment of East Asia's pension savings very challenging.

2.3.1 Financial repression

It is a well-documented feature of the so-called `East Asian miracle' that governments all over the region engage in more or less benign`financial repression' (Page, 1994). Formally speaking, financial repression consists of artificially maintaining interest rates below their market equilibrium (Shaw, 1973; McKinnon, 1973). Reinhart and Sbrancia (2011) identify a number of channels through which financial repression is exercised, including :

- Direct or indirect control over interest rates, such as interest on government debt and deposit rates;
- Government ownership or control of domestic banks and financial institutions;
- Relatively high bank reserve requirements;
- Creation of a captive domestic market for government debt, achieved by requiring domestic banks to hold government debt via capital requirements, or by prohibiting or dis-incentivising alternative options that institutions might otherwise prefer;
- Government restrictions on the transfer of assets abroad through the imposition of capital controls.

These channels of financial repression are all active to some degree in East Asian economies. Patrick and Park (1994) document the historical use of financial repression in Japan, Korea and Taiwan. In tandem with directed capital allocation through the banking system in the context of an aggressive industrial policy, this policy has been a staple of the Japanese development model and has also been replicated

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in the rest of the region, especially in Korea and China as figure figure 18 illustrates. Johansson and Wang (2012) provide an empirical confirmation of the continued and unique level of financial repression in East and South East Asia (see also Shih, 2011a, for a detailed analysis of the Chinese case) .

Financial repression acts as a form of tax on savers and subsidy for borrowers (Pettis, 2012). It has far reaching consequences which directly affect saving behaviour and the investment of pension assets.

The first consequence is to make the return on cash and fixed income securities very low and even negative in real terms. While this lightens the debt burden of the state-sponsored sector (i.e. firms that have privileged access to credit) and that of the public sector itself, it also forces households to save more.

This counter-intuitive results springs from the so-called `target saving hypothesis' by which households engage in an intuitive form of asset-liability management: under this hypothesis, households have more or less precise expenditure targets in mind (university fees, house or car purchase, rainy day fund etc.) and accumulate accordingly. It follows that the lower the return on savings, the more they accumulate, even when returns are negative.

Nabar (2011) test the target saving hypothesis using panel data for China's provinces over the period 1996-2009 during which urban household saving rates increased from 19% of disposable income to 30%. He finds that when the return on saving declines, it becomes more difficult to meet a target and households increase their saving out of current disposable income to compensate.

In effect, an increase in interest rates is expected to be lead to a decrease in savings and higher consumption in China (Pettis, 2012). However, this rebalancing tends not to occur since the embedded subsidy created by financial repression becomes increasingly difficult to reverse with the passage of time. Vittas and Cho (1995) make this argument in the case of Japan, and Pettis (2012) in the case of China.

The second important consequence of financial repression is its contribution to the build-up of excess savings in the economy, which we discuss in section 2.3.2. Excess savings imply a dynamically inefficient economy (i.e. an economy which fails to balance its long- and short-term objectives efficiently) and this has direct implications for asset allocation.

The third consequence of financial repression, in combination with excess savings, is to lead to the costly misallocation of large amounts of capital. Banks play a pivotal role in capital allocation in East Asia, and the combination of large captive deposits with interventionist credit allocation policies by the central government can lead to the issuance of an excessive amount of loans.

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Excessive origination leads to the over-leveraging of large part of the economy (e.g. real estate), well-documented excess capacity in a number of industrial sectors (e.g. steel production, shipyards, infrastructure, etc.) and eventually a build up of non-performing loans which can threaten the viability of the entire financial sector (e.g. Japan in 1991, Korea in 1998, China in 1999, Taiwan in 2003, etc.)

The excessive leveraging of the economy translates into asset bubbles and excessive volatility for investments in risky assets. We return to this point in section 2.3.3

2.3.2 Excess Savings

Thus, East Asia's households are understood to save `too much' due to their documented `target saving' behaviour as well as precautionary reasons (limited social security) and limited access to credit and insurance. However, governments and firms, especially state-controlled firms have also accumulated vast savings.

Large public reserves or savings are another consequence of the so-called East Asian development model and of the role of exports in supporting growth and investment as figure 3 illustrates in the case of China.

Because the export sector plays a dynamic role in the domestic economy, the governments of East Asia have been keen to preserve the price-competitiveness of their exports in international markets. Without intervention, their initial trade (current account) surplus would lead to an influx of liquidity in the domestic economy, higher prices and wages, and eventually a higher real rate of exchange with key trading partners, leading to a rebalancing of the current account.

To prevent a rebalancing of the current account, domestic inflation must be kept under control. Thus, East Asia's monetary authorities routinely engage in sterilisation programmes by which they exclude new foreign exchange from circulation in the domestic economy, thus building large foreign exchange reserves (hence a matching capital account deficit), and replace these liquidities with relatively illiquid and low-yielding 'sterilisation bonds' which the government imposes on the financial sector (including public pension reserves). Alternatively, the government can `freeze' a fraction of the money supply by increasing the reserve ratio of commercial banks [9] (see Ying et al., 2012, for an empirical analysis of the impact of sterilisation on capital mobility in East Asia).

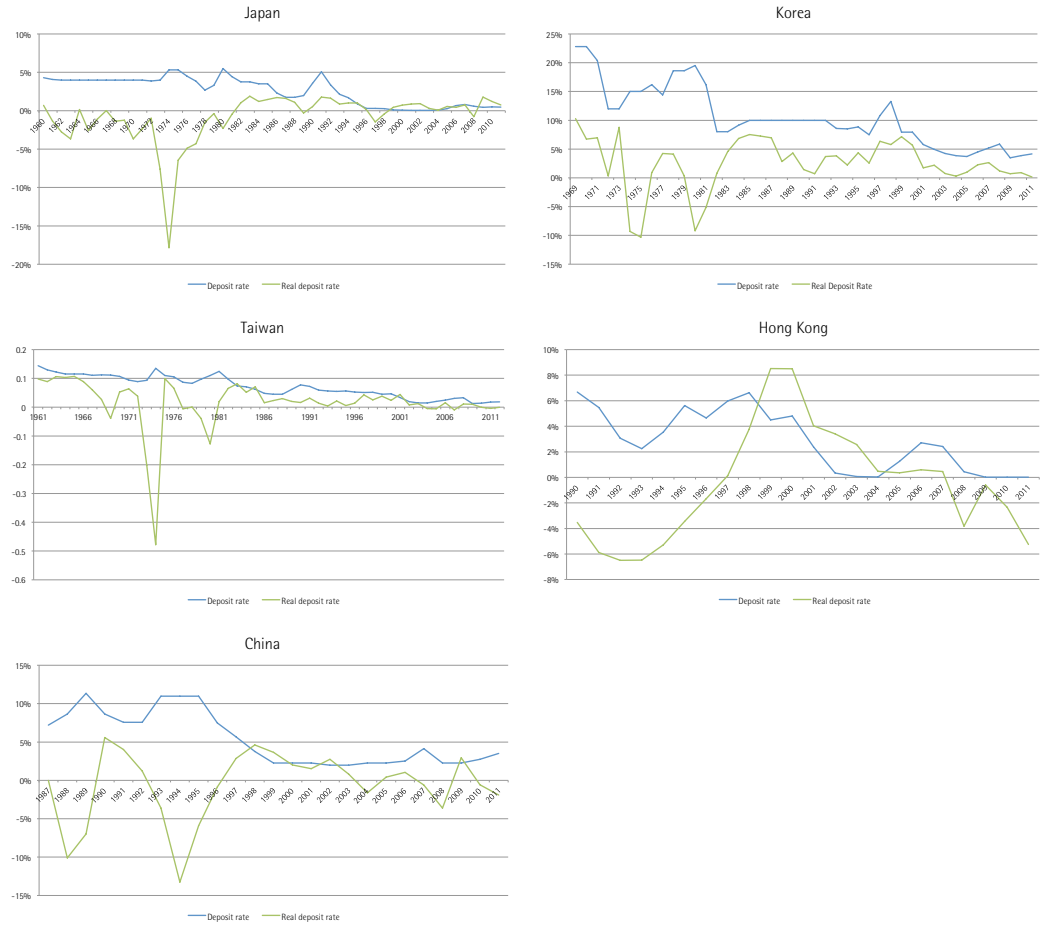
Structural excess savings result from such policies which prevent liquidities from circulating. To minimise the cost of sterilisation, interest rates have to be kept durably low, thus re-enforcing financial repression (see Rajan and Beverinotti, 2012, for a formalisation).

A typical symptom of excess savings is its impact on the velocity of money, that is, the ratio of nominal GDP to the money supply. In a `normal' economy, the velocity

9 - Inflation control is also seen as a paramount political objective in China, where high inflation is associated with social upheaval e.g. in 1989.

2. Accumulation and Intermediation

Figure 18: Nonimal and real deposit rates in East Asia



Source: CEIC, authors' computations

of money is stable in the long run and tends to follow the business cycle in the short run.

In East Asia however, it has been on a decreasing trend for a decades, indicating vast amounts of cash hoarding in the economy, as illustrated in figure 19. A declining velocity of money is strongly deflationary in the long run, as Japan also illustrates.

2.3.3 Asset bubbles and high volatility

Excess savings and very low interest rates also typically lead to excessive lending. As mentioned above, the high leverage of the economy is a source of volatility and may also lead to asset price bubbles and capital misallocation.

Wang (2011) among others document the structurally higher levels of volatility experienced in Asian stock markets and illustrated in table 1, and figures 20, 21,`22 and 23.

Likewise, asset price bubbles, especially in the real estate sector have been frequently experienced in the region, as documented by Quigley (2001); Chen (2001); Collyns and Semlali (2002); Green et al. (2009); Yiu et al. (2010).

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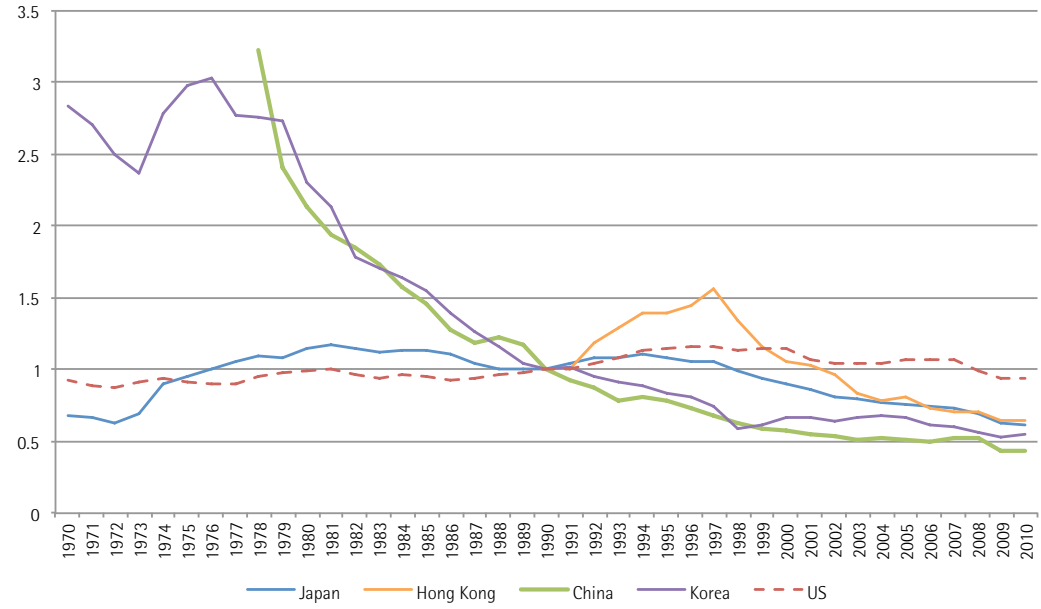
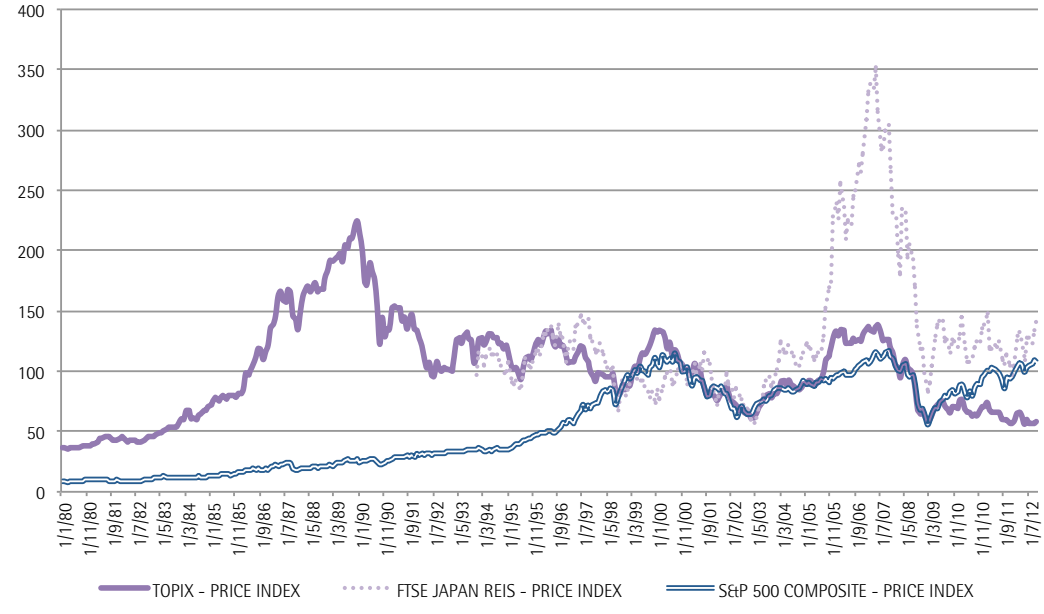
Figure 19: long-term velocity of money in East Asia and the US, 1970-2010, 1990=1*



Source: CEIC and authors' computations

$$\text{*Velocity of money} = \frac{\text{price level} \times \text{real output}}{\text{money supply}}$$

Figure 20: Japanese stock and listed real estate indices, 1980-2012, 2001=100



Source: Datastream, authors' computations

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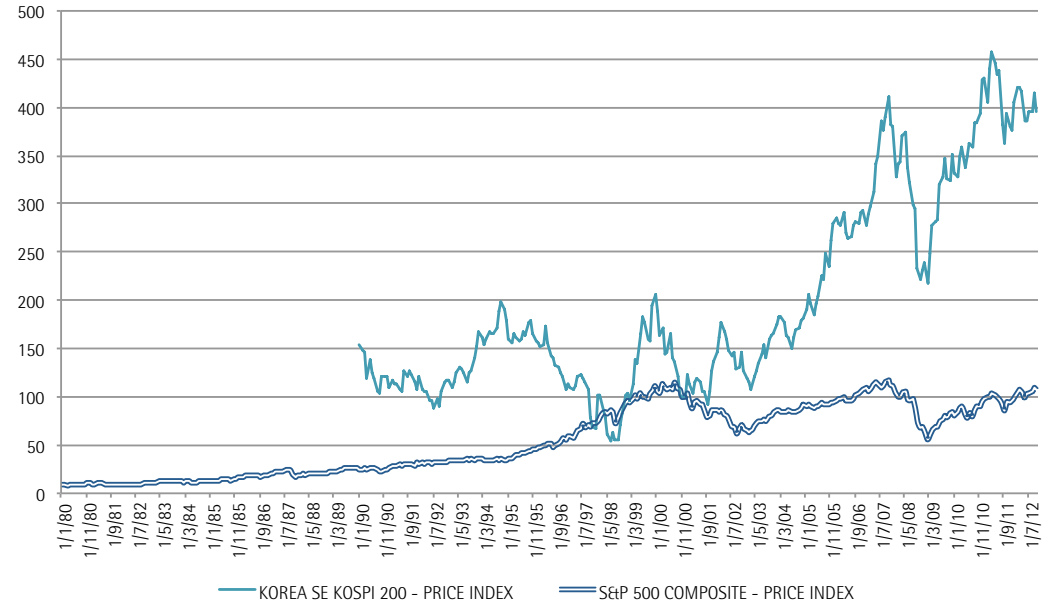
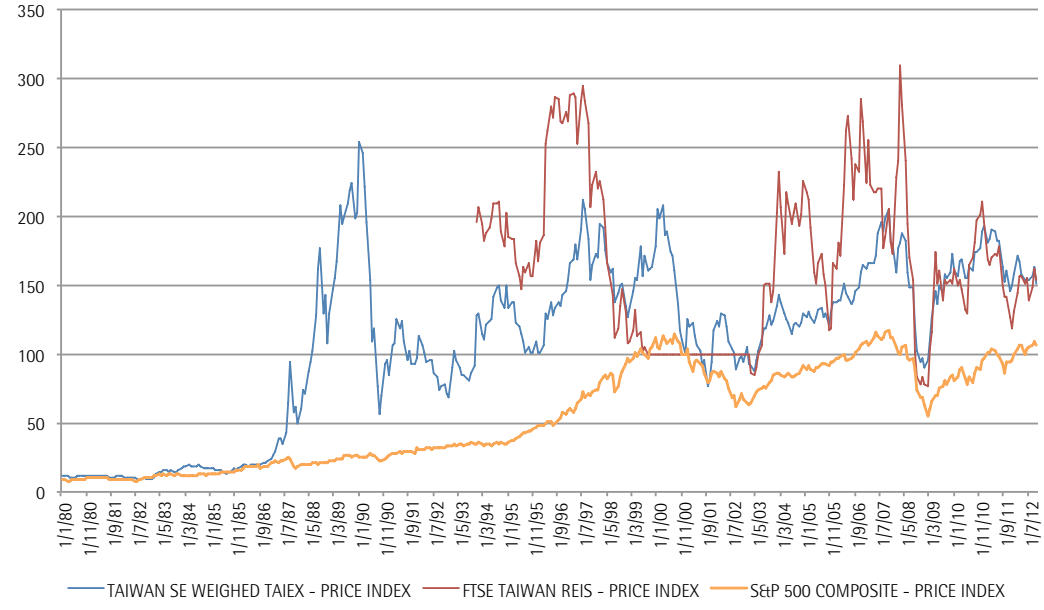
Figure 21: Korean stock index, 1980-2012, 2001=100



Source: Datastream, authors' computations

Figure 22: Taiwanese stock and listed real estate indices, 1980-2012, 2001=100



Source: Datastream, authors' computations

2. Accumulation and Intermediation

Table 1: Risk and returns characteristics of major stock market indices in East Asia

		Equity benchmarks (annualised, monthly data)					
		Japan	HK	Taiwan	Korea	China	USA
Nominal returns	60-year	5.5%					
	40-year	2.0%	9.2%	9.7%			6.6%
	20-year	-2.7%	6.5%	3.5%	6.8%	7.5%	6.3%
	15-year	-3.6%	4.9%	-0.1%	11.4%	3.8%	2.9%
	10-year	-1.5%	8.6%	4.6%	11.7%	3.2%	4.8%
	7-year	-9.1%	6.0%	3.2%	7.7%	9.5%	2.3%
	5-year	-15.1%	1.6%	-1.7%	6.2%	-5.1%	-0.1%
	3-year	-6.0%	-0.2%	-0.8%	6.6%	-11.7%	10.9%
Risk	60-year	18.7%					
	40-year	15.4%	33.4%	35.0%			15.7%
	20-year	18.3%	27.0%	28.1%	31.0%	49.8%	15.1%
	15-year	18.0%	25.8%	26.0%	33.0%	28.1%	16.3%
	10-year	18.0%	22.3%	22.0%	22.0%	29.5%	15.0%
	7-year	19.2%	24.6%	23.2%	21.4%	33.0%	16.7%
	5-year	19.8%	26.4%	24.5%	22.5%	32.7%	18.0%
	3-year	18.3%	20.5%	18.0%	17.8%	18.9%	15.6%
Real returns	60-year	2.7%					
	40-year	0.0%	5.9%	5.5%			2.2%
	20-year	-2.8%	3.9%	1.8%	3.0%	2.8%	3.7%
	15-year	-3.5%	4.2%	-1.1%	8.0%	2.0%	0.5%
	10-year	-1.3%	7.5%	3.5%	8.5%	0.6%	2.3%
	7-year	-8.9%	3.5%	1.8%	4.6%	6.4%	-0.3%
	5-year	-14.9%	-1.3%	-1.7%	2.8%	-8.8%	-2.3%
	3-year	-5.3%	-2.9%	-1.3%	3.3%	-14.3%	9.4%
Sharpe ratios	60-year						
	40-year						
	20-year	-0.17	0.09	-0.01			0.17
	15-year	-0.21	0.05	-0.10		0.03	0.02
	10-year	-0.09	0.29	0.13	0.36	0.02	0.21
	7-year	-0.48	0.15	0.06	0.19	0.19	0.04
	5-year	-0.77	-0.02	-0.14	0.10	-0.26	-0.11
	3-year	-0.33	-0.04	-0.11	0.21	-0.75	0.61

Source: Datastream, authors' computations

Japan's experience is again a cautionary tale for the rest of East Asia. The combined result of a stock market and a real estate bubble and the ensuing banking crisis have led to a `balance sheet recession' (Koo, 2003) that has greatly hampered the ability of domestic investors to access risk premia , and a created a `liquidity trap' condemning monetary policy to keep interest rates near zero as argued by (Roach, 2013).

2.3.4 An asset allocation puzzle

In a nutshell, the East Asian economic development model creates specific challenges to invest long-term pension assets: very low (negative) returns on low risk assets and very high perhaps excessive volatility on risky assets.

While risk mis-pricing in both fixed income and equity spheres hampers efficient asset allocation efforts, the absence of straightforward mean-reversion in the stock market (e.g. Japan) is a major imped-

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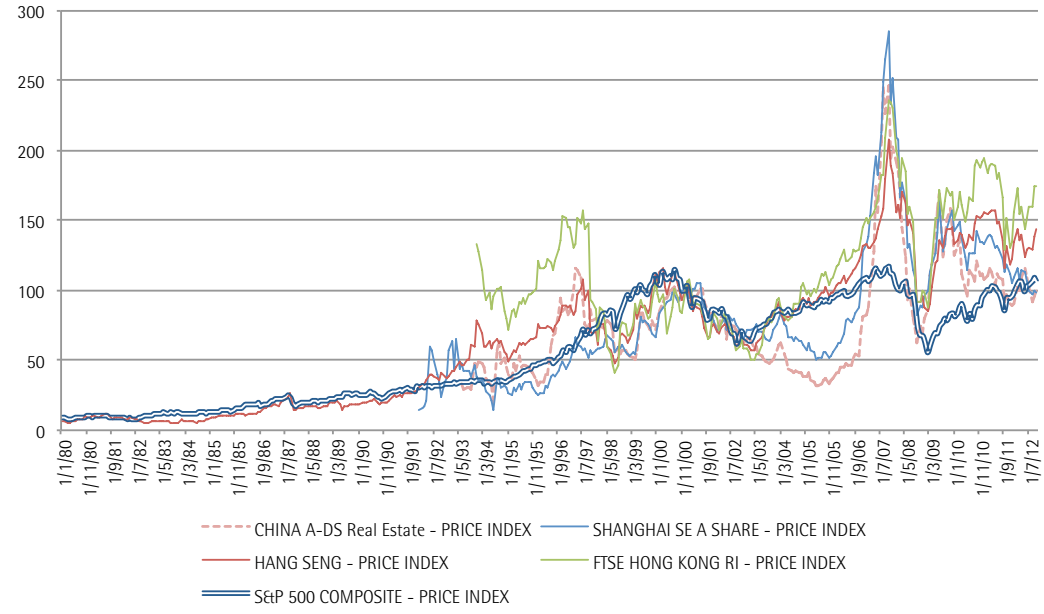
Figure 23: Hong Kong and Chinese stock and listed real estate indices, 1980-2012, 2001=100



Source: Datastream, authors' computations

iment to strategies based on exploiting such phenomena.

Risk control can also become limited when the risks to insure or hedge are not transient but the product of structural market distortions.

The difficulty with this economic development model is that it becomes very hard to reverse. The subsidies to firm's and the government's costs of capital become very addictive. Because debt is cheap, debt is everywhere and the slightest increase in interest rates (a move towards ending financial repression) could create significant damage in particular to sub-sovereign public sector balance sheets, resulting in substantial sovereign risk for pension funds that often hold more than half of their assets in domestic government bonds.

For example, the April 2013 downgrade of China's sovereign rating by two rating agencies (Reuters, 2013) springs from concerns that local government debt is estimated to have reached at least 50% of GDP (see Shih, 2010, 2011b) and total public debt at least 80% of GDP. Nevertheless, China's lifecycle deficits have only just begun to rise and the implicit liabilities embedded in the rise of public healthcare and pensions can be expected to be very significant.

2.4 The Regulation Challenge

Beyond the investment challenge, which we outlined above, the regulation challenge is to create the conditions for a better accumulation and management of East Asia's savings in the region to meet the aggregate and individual liabilities driven by

2. Accumulation and Intermediation

population ageing while maintaining fiscal stability.

In a nutshell, for countries like Korea or Taiwan, the question is to know how not to end up like Japan. It could be argued that the current situation of the Japanese pension system and of the Japanese economy is not only the result of bad demographics but also, perhaps mostly, the result of bad regulation of pension wealth accumulation and investment management.

From a regulatory standpoint, East Asia needs to incentivise adequate accumulation in investment vehicles dedicated to meeting consumption targets.

As we argue in the rest of this paper, few options currently exist for individuals to do so, which explains the lack of interest in pension schemes that remain for the most part a form of deferred compensation that does not pay a pension i.e. retirement income.

Likewise, the largest pool of assets, pension reserves, and social security reserves when they exist (e.g. China) are not managed to address the growing lifecycle deficits that characterise an ageing society, despite the facts that these evolutions are in great part predictable.

In the rest of this paper, we discuss in more details the role and issues affecting different funded pension systems in East Asia and how they can be realistically improved.

We focus on the pension reserve funds that back public PAYG systems in section 3, before examining corporate and occupational defined-benefit plans in section 4 and finally defined-contribution plans in section 5.

3. Improving Reserve Funds

3. Improving Reserve Funds

Blundell-Wignall et al. (2008) point out the absence of a universal definition of sovereign wealth funds (SWFs) and public pension reserve funds (PRFs).

SWFs are government-owned funds, which can serve a variety of tactical or strategic national objectives, such as the diversification of foreign reserve holdings or the protection from fluctuating commodity prices (e.g. in oil-producing countries).

In this paper, pension reserve funds are understood to be a particular case of sovereign wealth funds (SWFs) with an explicit objective to support the financial viability of a pension system, typically public pay-as-you-go (PAYG) pensions.

PRFs can either be controlled directly by the central government or by the social security system (social security reserve funds, SSRFs). In the former case, financing usually comes from direct contributions of fiscal revenues, while in the latter, those contributions are usually additional employment-related financings.

In East Asia, the majority of pension-related assets are held in such reserve funds - asset pools backing the obligations of PAYG schemes with explicit or implicit public sector support.

These reserves are the result of the fast demographic transition experienced in the region and discussed in section 2.2. The rapid growth of the workforce relative to the total population led to significant contribution growth in national pension systems that initially paid out pensions to relatively few retirees, hence the accumulation of a surplus, which can also be drawn to offset a public pension deficit at a later stage.

The existence of large pension reserves immediately raises the question of their management. In particular, if public pension systems can be expected to come under significant financial pressure during the last phase of the demographic transition, the choices made with regard to the management of these reserves may contribute to significant differences of outcome.

In effect, the existence of significant reserves represents a unique opportunity for the governments of East Asia to address and to improve on the known shortcomings of public pensions in rapidly ageing countries.

Seizing this opportunity will require making fundamental changes in the way reserve funds have been controlled and managed for the past decades, and adopting investment management processes and tools that will allow pension reserves to achieve what should be their sole objective: to support the public pension system by minimising the burden of pension liabilities on future generations while ensuring adequate public pension provision.

In this chapter, we review the relative importance and development of pension reserve funds, examine their current long-term objectives and short-term constraints,

3. Improving Reserve Funds

and review their asset allocations and performance.

We argue that the failure to specify clear long-term objectives and adequate short-term constraints is leading to suboptimal investment decisions. While there are signs that pension reserves are better managed than they used to be in the region, scientific rigour is still lacking and implementing better practices could be instrumental to improve the financial viability of public pension systems in the context of the growing lifecycle deficits described in section 2.2.3.

In particular, we observe that reserve preservation remains the main objective of numerous reserve funds, under the premise that reserves are intended to peak and eventually be entirely spent on pension benefits. Instead, East Asia's pension reserves, because they are large, should be used to address public pension liabilities in a systematic and dynamic manner.

Improving the management of pension reserves, given their domestic influence, should also play a role in setting and encouraging best practices in pension asset management in general in corporate and individual plans in the region.

In what follows (section 3.1), we first describe the role of pension reserves in East Asia. Next, we discuss the drivers of the liability process to which reserve funds are exposed (section 3.2).

Section 3.3 discusses objective setting and section 3.4 reviews the constraints imposed on the investment process of PRFs. In section 3.5 we discuss the resulting investment decisions taken by PRFs in East Asia. Finally, in section 3.6, we discuss a number of potential improvements. Section 3.7 summarises and concludes.

3.1 Reserve Funds: the largest pension assets of East Asia

With the exception of Hong Kong, all East Asian countries feature one or several reserve funds creating *de facto* funding of the pension obligations of national or public PAYG pension systems.

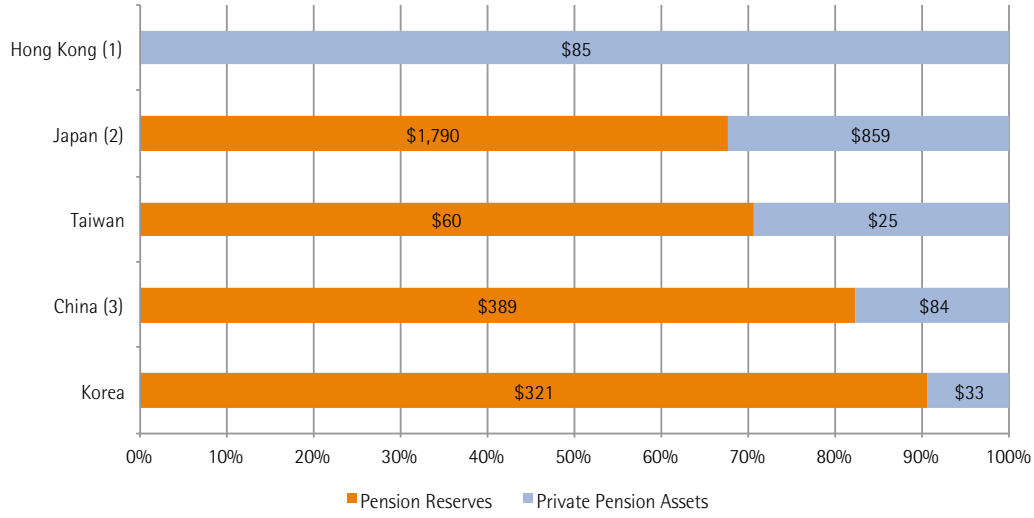
East Asian pension reserves feature amongst the largest such reserves relative to GDP in the world (see figure 25). They represent about one third of GDP in Japan or Korea but amount to much less relative to the size of the economy in Taiwan or China, as shown in table 2.

These reserves also represent the largest pool of pension-related assets in Japan, Korea, Taiwan or China as figure 24 illustrates. Their significant weight relative to total pension assets is a symptom of the underdevelopment of other dedicated accumulation channels for pension savings in the region as discussed in section 2. Hence, Reserve funds can play a pivotal role in the future of retirement saving management in East Asia.

Next, we describe pension reserve funds in each country in more detail.

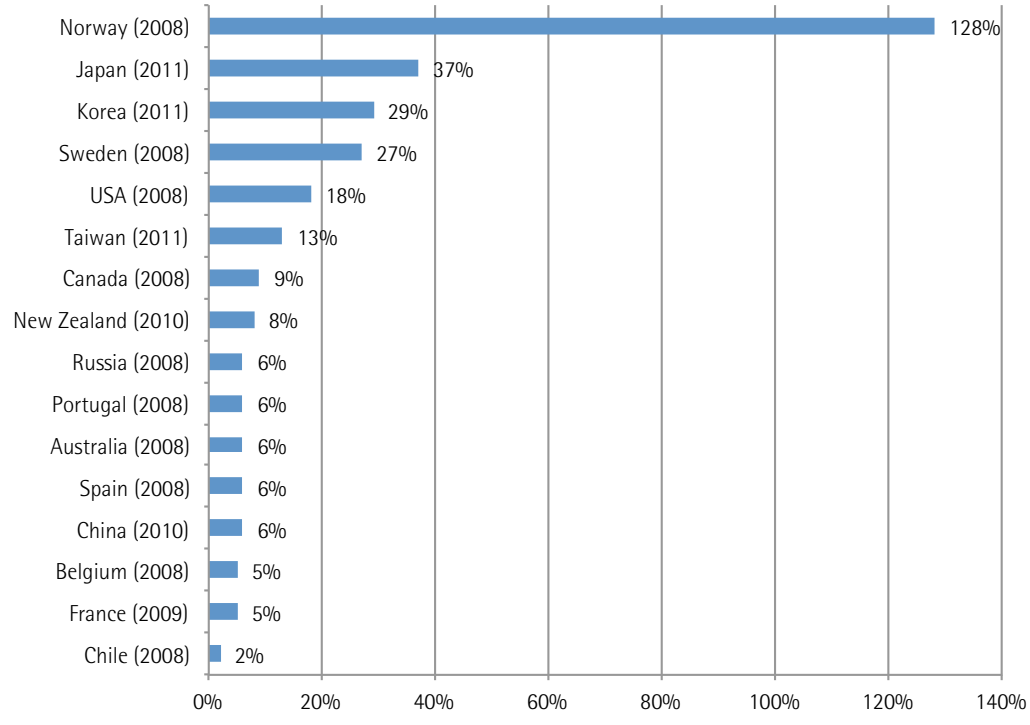
3. Improving Reserve Funds

Figure 24: Pension reserves as a proportion of total pension assets in 2011 (USD)



Source: Annual reports, World Bank Development Indicators, authors' computations
(1) 2012 figure (2) includes Mutual Aid Associations figure from 2009 (3) 2010 figure

Figure 25: Pension reserves as a proportion of GDP



Source: Annual reports, World Bank Development Indicators, authors' computations

3. Improving Reserve Funds

Table 2: Public pension reserve assets

Scheme	AUM (lcu bn)	% GDP	AUM (USD bn)	AUM (EUR bn)	as of
Japan					
Employee Pension Insurance (EPI)	116,600	25%	1,215	938	2011
National Pension Insurance (NPI)	7,200	2%	75	58	2011
Mutual Aid Associations (MAAs)	48,000	10%	500	386	2009
Korea					
National Pension Fund (NPF)	342,000	28%	308	238	2011
Government Employees Pension System (GEPS)	4,600	0%	4	3	2011
Korean Teachers Pension Fund (KTPF)	9,500	1%	9	7	2011
Taiwan					
National Pension Insurance Fund (NPIF)	100	1%	3	3	2011
Labour Insurance Fund (LIF)	450	3%	15	12	2011
Labour Retirement Fund (LRF)	560	4%	19	15	2011
*** closed to new members since 2005					
Government Employee & School Staff Insurance (GESSI)	180	1%	6	5	2011
Public Service Pension Fund (PSPF)	500	4%	17	13	2011
China					
National Social Security Fund (NSSF)	870	2%	140	108	2011
Urban Social Insurance (USI)	1,550	4%	249	193	2010

Source: Nomura (2010); Takayama (2012c,b); Ministry of Health, Labour and Welfare (2009); Urata (2009); Nomura (2012); National Institute of Population and Social Security Research (2011); Takayama (2003b,a); Ignites Asia (2013c); Ministry of Strategy & Finance (2012); Leckie and Xiao (2012); Zheng (2011); Oksanen (2012); Moo (2009); Shi and Mok (2012b); National Pension Fund (2011); Moon (2008); Seok et al. (2012); Phang (2007); Kim and Moon (2011); Kuo (2012); Takayama (2002); Moon (2009, 2002); Towers Watson (2012b,a); Mandatory Provident Fund Schemes Authority (2012a); Kim (2013); Shao (2010); Ju (2011); Ernst & Young (2012)

3.1.1 East Asia's reserve funds

East Asia's reserve funds can be broadly categorised into two groups:

- Private-sector workers are covered by the following mandatory schemes: Korean National Pension Fund (NPF), Japanese Government Pension Investment Fund (GPIF), Chinese Urban Social Insurance pools (USI), and Taiwanese Labour Insurance Fund (LIF).
- Public-sector workers are covered by the following mandatory schemes: Korean Government Employees Pension System (GEPS) and Teachers Pension Fund (KTPF), Japanese Mutual Aid Associations (MAAs organised by occupation), Taiwanese Government Employees and School Staff Insurance (GESSI) and Public Service Pension Fund (PSPF). Other schemes for this broad occupational category exist in each country but because they are completely unfunded i.e. they have no reserve assets, they are not discussed here.

Table 3 provides additional details about each reserve fund.

Additionally, two Taiwanese funds are included in the following discussion:

- The previously mandatory Labour Retirement Fund (LRF) has since been replaced by a DC system and is therefore closed to new members.
- Additional coverage for those not included in the above systems is provided by the voluntary Taiwanese National Pension Insurance Fund (NPIF).

As mentioned above, there is no dedicated pension reserve in Hong Kong, nor is there any contributory public PAYG pension system.

Table 3: Public pension schemes with a managed reserve in East Asia

Scheme	Created	Brief Description	Management	Mandatory	Eligibility
Japan					
Employee Pension Insurance (EPI)	1942	- Reserve-backed PAYG plan for private sector - Managed by the Government Pension Investment Fund (GPIF)	Public	Yes	Private-sector employees and their spouses
National Pension Insurance (NPI)	1961	- Reserve-backed PAYG plan for private sector - Managed by the Government Pension Investment Fund (GPIF)	Public	Yes	Self-employed individuals, part-time employees, unemployed spouses
Mutual Aid Associations (MAAs)	1949	- Reserve-backed PAYG plans for public sector (private sector voluntary MAAs excluded) - Managed by separate entities according to occupation, e.g. local government (Chikyoren), private schools (Shigaku Kyosai), municipal personnel (Shichousonren)	Public	Yes	Public-sector employees (some private-sector occupations on voluntary basis but excluded from these statistics)
Korea					
National Pension Fund (NPF)	1988	Reserve-backed PAYG plan for private sector	Public	Yes	Employed and self-employed workers (unemployed contribute voluntarily)
Government Employees Pension System (GEPS)	1960	Reserve-backed PAYG plan for public sector	Public	Yes	Government employees and public school teachers
Korean Teachers Pension Fund (KTPF)	1975	Reserve-backed PAYG plan for private school teachers	Public	Yes	Private school teachers
Taiwan					
National Pension Insurance Fund (NPIF)	2008	- Reserve-backed PAYG system for uninsured individuals - Managed by the Bureau of Labour Insurance (BLI)	Public	No	Unemployed, housewives and others aged 25-65 and not covered by other systems
Labour Insurance Fund (LIF)	1950	- Reserve-backed PAYG system for private sector - Managed by the Bureau of Labour Insurance (BLI)	Public	Yes	Employees at companies with at least 5 staff, self-employed workers, civil servants, private teachers and fishermen
Labour Retirement Fund (LRF) *** closed to new members since 2005	1984	- Reserve-backed supplementary PAYG system for private sector - Replaced by Labour Pension Fund (LPF)	Public	No	Employed workers
Government Employee & School Staff Insurance (GESSI)	1958	- Reserve-backed PAYG system for public sector - Managed by Bank of Taiwan (BOT)	Public	Yes	Civil workers, public and private teachers
Public Service Pension Fund (PSPF)	1995	Reserve-backed supplementary PAYG system for public sector	Public	Yes	Civil workers, public teachers, military personnel
China					
National Social Security Fund (NSSF)	2000	- Reserve fund managed by the National Council for Social Security Fund (NCSSF) - Not financed from pension contributions	Public	N/A	N/A
Urban Social Insurance (USI)	1997	Public pension reserves accumulated independently in each province and backing PAYG plans	Public	Yes	Urban workers

Source: see table 2

3. Improving Reserve Funds

3.1.2 Funding sources and shortfalls

Pension reserves (assets) come from contribution surpluses (PAYG contributions in excess of pension payouts), investment income and some degree of government transfers. With the exception of the LRF in Taiwan, East Asia's reserve funds remain open to new members and new contributions.

The Chinese National Social Security Fund (NSSF) is a unique case. It is financed from privatisation proceeds and other government revenues, but not explicitly from pension contributions. Furthermore, the NSSF acts as the asset manager of a number of Chinese provincial pension reserve pools (USI). It remains an experimental vehicle for pension reform in China and an outlier in the context of this study.

Despite being the largest pension-related asset pool in the region, the growth of public pension reserve assets is limited by a number of factors, especially low contribution levels, high delinquency and low investment income.

Historically, social assistance programmes have been limited in the region (see Hwang, 2002; Henrard, 2011, among others) and public pension systems were designed to be contributory. Contributions have been made primarily and equally by employers and members as shown in table 4.

The cost of pensions to employers is an important limitation of the level of contributions. While contribution rates are arguably low, increasing them tends to increase non-compliance (see Phang, 2007; Takayama, 2008; Williamson et al., 2011; Lee, 2012; Oksanen, 2012, among others).

In economies like Taiwan, a substantial number of companies are SMEs and find it difficult to comply with pension regulations. Indeed, in China and Taiwan, employers carry a greater proportion of contributions than individuals.Shi and Mok (2012b) illustrate the gravity of non-compliance in Taiwan before the LRF reform: 80% of companies made no contribution, while 20% paid the minimum contributions of 2%.

In East Asia in general, export-driven development strategies with a significant emphasis on international wage competitiveness mean that the enforcement of pension contributions may potentially conflict with other policy goals. For this reason delinquency can remain high, especially the under-reporting of employees' wages by employers.

Nevertheless, reserve funds in East Asia commonly back pension schemes considered to pay generous benefits and that have not always been contributory in the past. This is particularly the case in countries with large state-controlled industrial sectors. As a result current contribution rates are often below the actuarially rate required to meet the future pension obligations of PAYG systems.

In most countries, ongoing incremental parametric reforms [10] aim to increase contribution rates while decreasing benefits, but

10 - Parametric reforms include any changes to the plan's parameters, including contribution rates, accrual and benefit formulas etc.

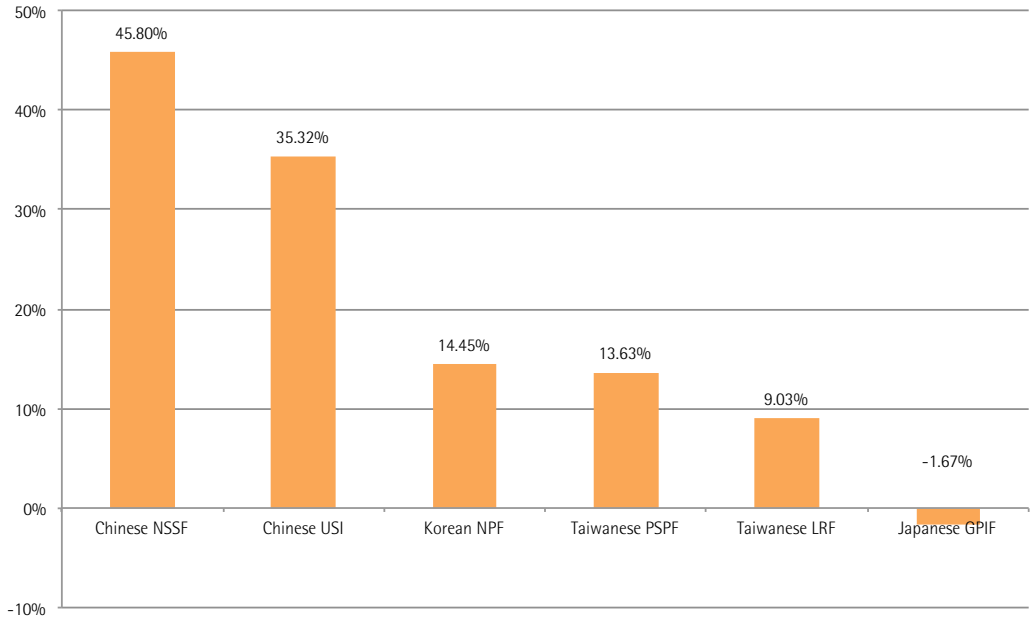
Table 4: Participation and contributions to public pension schemes with a managed reserve

Scheme	Participants (th)	as of	Recipents (th)	as of	% empl. pop	Employer Contribution	Employee Contribution	Contribution Limits
Japan								
Employee Pension Insurance (EPI)	34,400	2011	13,000	2011	55%	8%	8%	Dependent on assessible income
National Pension Insurance (NPI)	19,400	2011	24,000	2011	31%	None	JPY 15,100	Not applicable
Mutual Aid Associations (MAAs)	4,500	2009	3,900	2009	7%	Plan dependent, min 6.00%	Plan dependent, min 6.00%	Dependent on assessible income
Korea								
National Pension Fund (NPF)	342,000	2011	12,000	2011	78%	5%	5%	Pensionable income cannot exceed 120% of average earnings
Government Employees Pension System (GEPS)	4,600	2009	290	2009	4%	7%	7%	Dependent on pensionable income
Korean Teachers Pension Fund (KTPF)	9,500	2009	30	2009	1%	7.00% from government and employer	7%	Dependent on pensionable income
Taiwan								
National Pension Insurance Fund (NPIF)	100	2011	1,200	2011	20%	None	7.50% from government and employee	Dependent on pensionable base of TWD 17,280 per month
Labour Insurance Fund (LIF)	450	2011	190	2011	90%	5.25% from employer and 0.75% from government	2%	Dependent on pensionable income of max TWD 43,900 per month
Labour Retirement Fund (LRF) *** closed to new members since	560	2011	440	2011	32%	Plan dependent, min 2.00%	None	15% of salaries
Government Employee & School Staff Insurance (GESSI)	180	2011	N/A	N/A	6%	5%	3%	A maximum of coverage years applies
Public Service Pension Fund (PSPF)	500	2011	210	2011	6%	9.70% from government	5%	Contributions are calculated based on twice the basic pay
China								
Urban Social Insurance (USI)	194,000	2010	63,000	2010	25%	Plan dependent, 20.00% on average	None	Employer contribution max 300% of average provincial salary including contributions to USI

Source: see table 2

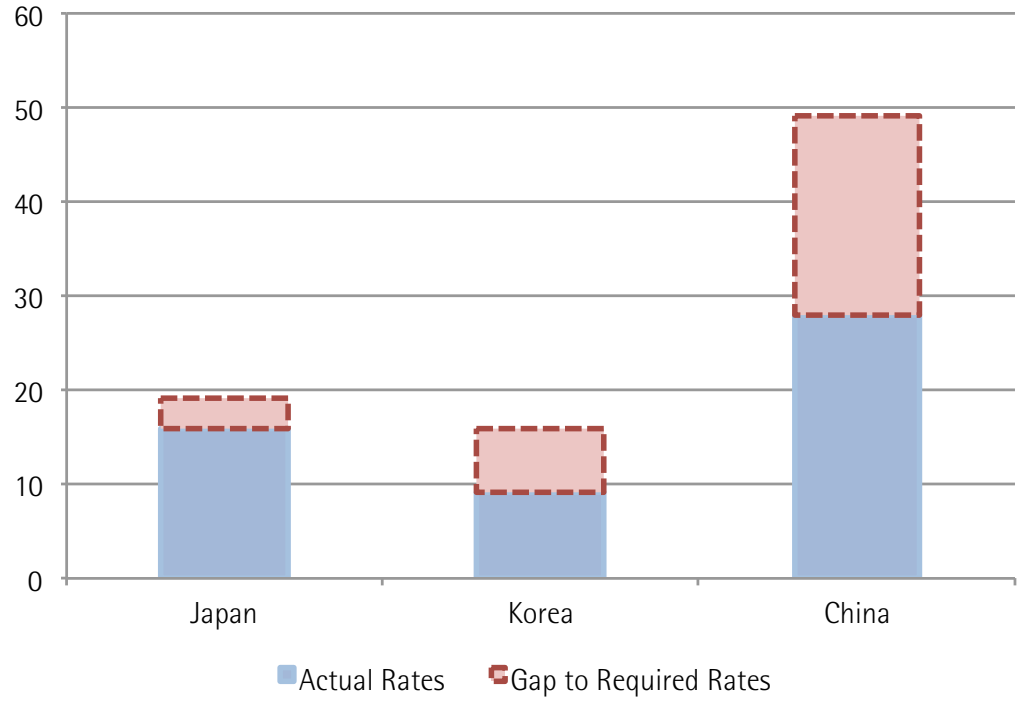
3. Improving Reserve Funds

Figure 26: Public pension reserve asset annualised growth rate 2001-2011



Source: Annual reports, authors' calculations

Figure 27: Required vs. actual contributions in PAYG pensions in East Asia, 2011



Source: OECD (2012)

3. Improving Reserve Funds

the pace of parametric reforms is too slow to reverse the imbalance between contribution and benefit rates and reserve funds in the region are not in a position to meet the liabilities of the public pension system. The existing actuarial imbalance of reserve funds is documented in internal and external evaluations of the state of their liabilities (Asian Development Bank, 2012). As in public pension schemes in other regions, large unfunded liabilities exist in East Asia, yet they are ignored (Cocquemas, 2013).

Lax funding objectives (see section 3.4.1) and low contribution rates exacerbate the problem (see figure 27). For example, Korea's NPF and Japan's EPI and NPI have accepted contribution rates which were lower than the required minimum under each government's own projections (Yang, 2008; Ministry of Health, Labour & Welfare, 2009).

In some cases, government support is thus necessary. In Japan's GPIF, the government subsidises part of the basic benefit. In all of Taiwan's reserve funds, the government co-pays part of mandatory contributions.

Thus, while reserves continue to grow significantly in most countries as shown in figure 26, the combination of low contributions levels in relation to promised benefits as well as low collection rates means that East Asia's reserve funds are not as large as they should be.

Moreover, without long-term financial sustainability, reserve funds are eventually forced to wind down and leave future generations exposed to potentially much higher contribution rates (see Moon, 2009, for instance).

This process has already begun at Japan's GPIF, which, as one of the most mature schemes in the region. Draw-downs to meet pension obligations officially begun in 2004 (as discussed in IPAsia, 2010a; Ministry of Health, Labour and Welfare, 2009) and shown in figure 26.

In Korea, research examining the actuarial sustainability of reserve funds finds that the NPF will exhaust its reserve around 2060, while its unfunded liability may reach 100% of GDP by 2070 (Moon, 2009). The continued deficit of Korea's GEPS is also shown to be structural (Kim and Moon, 2011).

In China, roughly half of the provinces were in deficit in 2010 (Zheng, 2011). Chinese public pensions include the liability of the previous, non-contributory system, and thus must rely on transfers as a form of intergenerational solidarity.

Taiwan's LRF is also underfunded, while the LIF has reportedly large unfunded liabilities (Chiu, 2004).

Instead of being invested and managed to optimise the ability of the reserve fund to support the public pension system, pension reserves thus play a passive role in the management of the demographic transition and are expected to peak with the working population and to eventually be spent

3. Improving Reserve Funds

almost entirely to fill the financing gap of public pension systems.

The absence of focus on investment income to meet future pension obligations (detailed in section 3.3) means that the funding shortfall of pension reserve funds is not actively addressed.

Next, we examine the drivers of the liability process that pension reserves are implicitly exposed to.

3.2 An opaque and ill-defined liability process

Even if it is not explicitly recognised and addressed in the investment strategy of pension reserves, the liability of the public pension system exists and pension reserves are directly exposed to it.

The main determinants of the reserve's implicit or explicit liability are population dynamics, parametric reforms and actuarial and accounting rules.

3.2.1 The requirement of age-consistency

Because they are part of national pension systems, reserve funds are the most directly affected by demographic change and the consequences of population ageing discussed in section 2. Indeed, even in a growing economy, certain sectors (e.g. services) may be hiring an increasingly large number of younger workers, and their DB pension plans, when they exist, may thus have very different demographics than the country as a whole.

However, most pension reserves exist to support the payment of retirement income on a scale corresponding to the entire workforce. As discussed above, population ageing is defined as a reversal of the ratio of effective workers to that of effective consumers (Lee and Mason, 2011). As a consequence, a increasing number of retirees must be paid a pension while a decreasing number of workers contribute to the pension system.

Understanding this dynamic process is essential to the management of the pension reserve: contribution levels and labour productivity can only increase within certain limits and any shortfall requires either to lower contributions or spend the reserve, or to increase public transfers or, crucially, to improve the investment income of the reserve.

Without a proper understanding of the impact of population ageing on the liability of the reserve, all these parameters are adjusted without much visibility or even understanding of the consequences.

For example, the Japanese government's official target replacement ratio (the ratio of retirement income to final or weighted average labour income) for the PAYG system is 50.1% from 2038 onwards, down from around 59% in 2010. This projection is based on medium estimates in mortality (average life expectancy of 83.67 years for male and 90.34 years for female subscribers in 2055) and birth rate (total fertility rate of 1.26 in 2055) an investment yield of 4.1%, a wage

3. Improving Reserve Funds

increase of 2.5% and a CPI increase of 1.0%. (Ministry of Health, Labour & Welfare, 2009).

However, a peak in ageing is expected around 2050, at which point the availability and use of pension reserves will be crucial and if reserves have been exhausted by then, the replacement ratio is expected to drop to 40%.

This example illustrates the variability of pension outcomes if the demographic process is not explicitly and correctly taken into account. Moreover, while this process is highly dynamic (i.e. predictable, with a margin of error) the corresponding dynamic management of pension reserves should be instrumental to meet pension objectives.

Unfortunately, the management of pension reserves consists mostly in the **passive and *ex post facto* adaptation** to demographic change, often by changing long-range assumptions about the performance of the economy or fertility levels, or by engaging in piecemeal parametric reforms, which we discuss next.

3.2.2 Limited parametric reforms

With the acceleration of ageing and the exacerbation of actuarial imbalances in public pension systems, East Asian reserve funds are undergoing parametric reforms. Parametric reforms commonly adjust contributions, benefits or the retirement age, but affect only future retirees, hence their full impact is only realised decades later. In the long run, the reserve's liabilities are determined by these parameters:

- Contribution and benefit rates: these rates determine the financial surplus in each year and should therefore be actuarially fair and balanced, in order to ensure funding adequacy and allow for reserve accumulation.
- Annuitisation: the cost of an indexed income stream is generally higher than an equivalent lump sum, especially if inflation risk is high, and it also increases the financing and longevity risk of reserve funds.
- Contribution ceilings and taxation: these parameters affect incentives to contribute and therefore asset accumulation.
- Retirement age: defines the start of the payout period and thereby impacts the accumulation period, liability duration and the actuarial balance of the fund.
- Indexation and guarantees: these additional promises are hard to model and introduce additional volatility on the liability side which is not always adequately addressed on the asset side.

Table 5 and 6 summarise the above parameters in connection with pension reserve funds in East Asia. The slow pace and often piecemeal aspect of these reforms complicates the determination of the reserve's liabilities.

For example, Korea's NPF identified structural weaknesses as early as 2003, but only passed a partial version of the necessary measures in 2007 (Moon, 2009), while the Government Employee Pension Scheme (GEPS) was not reformed until 2009 in spite of long-standing deficits (Kim and

3. Improving Reserve Funds

Table 5: Public pension schemes parameters

Scheme	Ret. Age	Taxation	Benefit Composition	Premature Withdrawal	Vesting or Accrual Rules	Full Benefit Eligibility	Minimum Benefit Eligibility	Indexation and Guarantees	Target Repl. Rate
Japan									
Employee Pension Insurance (EPI)	60	Tax-exempt contributions	- Basic pension plus remuneration-related benefit paid as monthly pension - Includes survivor, disability and other benefits	No	Annual accrual of 0.55% of lifetime average salary	40 years of contributions	25 years of contributions	Wage and inflation indexation	60%
National Pension Insurance (NPI)	65	Tax-exempt contributions	- Basic pension plus flat-rate additional benefit paid as monthly pension - Includes survivor, disability and other benefits	No		40 years of contributions	25 years of contributions	Inflation indexation	
Mutual Aid Associations (MAAs)	65	Tax-exempt contributions	- Lump sum allowed with less than 25 year of contributions - Includes occupational addition - Can include survivor, disability and other benefits	No	Plan and occupation dependent accrual rates	65 years of age	25 years of contributions	- Wage indexation before 65 - Inflation indexation after 65	72%
Korea									
National Pension Fund (NPF)	60	- Tax-exempt contributions - Benefits taxed at withdrawal	- Basic minimum benefit plus earning-related benefit paid as monthly pension - Lump sums possible only if member becomes public employee or has less than 10 years of contributions - Includes disability and survivor benefit	No	Accrual of 0.75% of average salary per year of contributions	- 60 years of age - 20 years of contributions	- 55 years of age - 10 years of contributions	- Inflation indexation - Guaranteed interest in case of lump sum	50%
Government Employees Pension System (GEPS)	65	- Tax-exempt contributions - Benefits taxed at withdrawal	- Lump sum if less than 20 years - Annuity benefit possible if more than 20 years of contributions - Includes survivor benefits and an additional retirement allowance	No	- Accrual of 1.90% of average salary per year of service - Progressive accrual rate for the additional retirement allowance	33 years of service	20 years of service	Inflation indexation	65%
Korean Teachers Pension Fund (KTPF)	65	- Tax-exempt contributions - Benefits taxed at withdrawal	- Lump sum if less than 20 years contributions - Annuity benefit possible if more than 20 years of contributions - Includes disability, survivor, medical, disaster benefits and loans to members		Progressive accrual rate averaging to 1.90% of average salary per year of service	33 years of service	1 year of service	- Inflation indexation above the annual inflation rate - Wage indexation	76%

Source: see table 2

3. Improving Reserve Funds

Table 6: Public pension schemes parameters (continued)

Scheme	Retirement Age	Taxation	Benefit Composition	Premature Withdrawal	Vesting or Accrual Rules	Full Benefit Eligibility	Min Benefit Eligibility	Indexation and Guarantees	Target Repl. Rate
Taiwan									
National Pension Insurance Fund (NPIF)	65	- Employee contributions deductible up to TWD 24,000 per year - Lump sum benefit deductible up to TWD 150,000 - Monthly benefits deductible up to TWD 650,000 per year	- Monthly benefit only - Includes disability, maternity, death and survivor benefits - Means tested	No	Accrual of 1.3% of pensionable base per year of coverage			Inflation and wage indexation	
Labour Insurance Fund (LIF)	60	- Employee contributions deductible up to TWD 24,000 per year - Lump sum benefit deductible up to TWD 150,000 - Monthly benefits deductible up to TWD 650,000 per year	- Annual benefit - Lump sum with reduction possible with less than 15 years of contributions - Includes injury, old age, medical care, disability, survivor andmaternity benefits	No	Accrual of 1.55% of highest average monthly pensionable salary per coverage year	15 years of contributions	1 year of contributions	Inflation indexation	
Labour Retirement Fund (LRF) *** closed to new members since 2005	55	- Employee contributions deductible up to TWD 24,000 per year - Lump sum benefit deductible up to TWD 150,000 - Monthly benefits deductible up to TWD 650,000 per year	Lump sum only	No	- Accrual of 2 end average salaries up to 15 years and 1 end average salary thereafter - 15 years service and seniority	25 years at same employer	15 years at same employer	Guaranteed interest rate	
Government Employee & School Staff Insurance (GESSI)	55	- Employee contributions deductible up to TWD 24,000 per year - Lump sum benefit deductible up to TWD 150,000 - Monthly benefits deductible up to TWD 650,000 per year	- Monthly benefit - Lump sum possible with less than 30 years of service - Includes disability, death and parental leave benefits	No	Accrual of 3 basic salaries for each year of service	30 years of service	15 years of contributions		
Public Service Pension Fund (PSPF)	60	- Employee contributions deductible up to TWD 24,000 per year - Lump sum benefit deductible up to TWD 150,000 - Monthly benefits deductible up to TWD 650,000 per year	- Monthly benefit after 50 years of age - 40% of basic salary for each year in service is paid monthly - Lump sum with reduction otherwise - Includes survivor benefit and severance pay	No	- Accrual of 4 basic salaries for each year of service	Age and years in service should sum to 85	5 years of service	Guaranteed interest rate	95%
China									
Urban Social Insurance (USI)	60 for men, 55 for women	- Tax-deductible contributions - Benefits and investment income taxed at withdrawal	- Basic monthly benefit - Monthly pension paid as annuity benefit - Lump sum if less than 15 years of contributions	No	- According to benefit formula - Plan dependent	15 years of contributions	None	- Indexation above inflation and below wage increase	Plan dependent, 20% on average

Source: see table 2

3. Improving Reserve Funds

Moon, 2011). Granted the non-maturity of the system, these reforms may have been timely, but the retirement age will only begin increasing from 2013 i.e. a decade after the need for reform was first identified.

Parametric reforms at Japan's historically generous Employment Pension Insurance (EPI) and National Pension Insurance (NPI), backed by the GPIF, were also implemented at a slow pace (see for example Takayama, 2012b). Target replacement ratios are currently being reduced (Ministry of Health, Labour and Welfare, 2009), but an additional benefit with a generous means test has been added (Takayama, 2012b).

Taiwan's PSPF also began increasing contribution rates in 2000 but is raising benefits in parallel, having only become contributory in 1995 (Kuo, 2012). The LIF and NPIF undergo parametric changes almost every year, because their legal framework demands contribution rate increases if funding drops below a certain level. However, the unification of investment management for the LIF and LRF (Labour Pension Fund, 2011), among others, under the umbrella of the reformed Labour Pension Fund (LPF) may contribute to improving practices.

China's fragmented USI system is hard to harmonise: provinces are allowed to set their own contribution and benefit rates in accordance with their financial situation (Leckie and Xiao, 2012; Zheng, 2011).

Parametric reforms thus tend to lag the underfunding issues of pension reserves, sometimes by a decade, and are often too *ad hoc* to know what their impact will be since they can affect liabilities both directly and indirectly by modifying incentives and expectations. Again, these reforms are an example of inadequate passive-reactive adaptation to the dynamic problem of the reserve fund's liabilities.

3.2.3 Accounting standards

Finally, another important driver of the pension reserve funds' liability is a matter of actuarial and accounting standards, as these determine materially both the size of liabilities and the extent to which funding levels give a realistic view of obligations. These are not consistent throughout the region and mark-to-market valuation is not always required.

- Only Korea has fully adopted the International Financial Reporting Standards (IFRS), and did so recently in 2011.
- In Japan, the predominant actuarial method used is the accrued benefit obligations (ABO) method, instead of the more transparent projected benefit obligations (PBO) method. The country has postponed the full adoption of IFRS measures until 2015 and continues to use local generally accepted accounting principles (GAAP) (The Accountant, 2011).
- Taiwan should introduce the IFRS in 2013, expecting unlisted companies to comply by 2015 (International Benefits Network, 2011), but some pension funds in Taiwan have been using market valuation ahead of IFRS introduction.
- China, in contrast, uses the cost method of accounting (Zheng, 2011). While it is unclear if the NSSF marks its portfolio to

3. Improving Reserve Funds

market, its annual report refers to `fair value' valuation Leckie and Xiao (2012).

In the absence of a well-understood and well-defined liability, setting appropriate investment objectives for pension reserve funds is almost impossible. Next we, review the investment objectives of the different pension reserve funds in the region.

3.3 Setting investment objectives for pension reserves

As highlighted above, PAYG pension obligations or benefits translate into a *de facto* liability process for the public sector, which is a function of a number of parameters including benefit eligibility and vesting, indexation promises and accounting rules.

Insofar as public pension reserves have the goal of meeting all or part of this liability, it should translate into long-term investment objectives for the managers of the reserve.

However, this is not self-evident and the decision making process leading to the adoption of these objectives plays an important role. In this context, the literature has long argued that reserve assets for the payment of pension and social benefits should be `ring-fenced' (Yermo, 2008).

Despite being the funded component of PAYG pension systems, pension reserves in East Asia are not designed to manage public pension liabilities. Typically, long-term public pension liabilities are not addressed explicitly in the reserve's investment strategy.

Instead, these reserves tend to be given multiple investment objectives, some of which may even conflict with their implicit or explicit responsibility to support the public pension system. Across the region, pension reserve management is not independent from political influence.

Table 7 and 8 summarises the declared objectives of the relevant reserve funds. While they are indeed mostly mandated to provide support the public pension system with respect to the payment of pensions, **long-term investment objectives requiring the explicit management of public pension liability are typically not defined.**

3.3.1 Multiple investment objectives

Reserve funds in East Asia are used for other purposes that managing public pension liabilities, including contributing to macroeconomic policy objectives or playing a role normally devoted to the central bank like the mass purchase of government bonds.

For example, Kim and Stewart (2011) list attempts to use the NPF to invest in the domestic stock market, contribute to the exchange rate stabilisation, finance various government projects and serve as a white knight against hostile takeovers.

Moon (2002) claims that Korean pension reserves are seen as a cheap source of development capital. Likewise, Taiwan's reserves had been used on several occasions until 2004 to stabilise markets (Chiu, 2004).

3. Improving Reserve Funds

Table 7: Pension reserve funds objectives

Country	Reserve Fund	Declared Goals & Objectives
Japan	GPIF	- To gain the public trust by becoming an organisation that steadfastly achieves its mission through contributing to the fiscal stability of the nation's public pension schemes - To ensure stable pension financing and maximum possible benefits, and equalise intergenerational imbalances through safe and efficient investment - To manage reserves safely and efficiently from a long-term perspective solely in the interest of insured members by upholding the principle of diversified investment - To secure the necessary liquidity for pension payments and manage cash efficiently - To implement appropriate risk management based on market trends and fulfill fiduciary responsibilities - To pursue efficient administration as an independent institution - To consider revisions, even in the medium term, if drastic market changes occur - To rebalance the portfolio whenever it deviates from the permissible asset weight ranges
Japan	MAAs	- To pay pension and health benefits, manage assets and improve member welfare - To maintain a long-term point of view and operate safely and efficiently - To exceed the planned investment rate established by the supervising ministry, based on actuarial reviews - To bridge any shortfalls from the required rate of return but without taking on unnecessary risks - To maintain asset allocations within the pre-determined ranges per asset class - To purchase government and municipal bonds and delegate asset management to financial institutions
Taiwan	LIF	- To protect workers' livelihood and promote social security - To pay insurance premiums, invest in bonds and deposits, lend to members or fund-operated hospitals, or finance government-approved projects, as well as other government-approved investments - To create the largest surplus on the basis of security and estimate future expenditures and economic factors when allocating assets - To utilise the fund by taking safety, profitability, liquidity, public interest, and labor welfare into consideration - External managers must perform above the benchmark. - The fund may be applied or disposed of for no other purposes than the payment of insurance benefits or for investment purposes. - Rules for the utilisation of the fund shall be drafted by the Bureau of Labour Insurance.
Taiwan	NPIF	- To ensure the basic economic safety for citizens not adequately covered by other social insurance programmes in old age, maternity, or mental or physical disability, as well as the stability of the lives of their surviving family - To enhance the sustainability of the fund via the pursuit of reasonable remuneration, and to alleviate premium rate adjustments - To maintain a long-term investment strategy using active and passive management and keeping assets and liabilities in mind - To measure investment risk and maintain or exceed the rate of return used in the latest actuarial report - In addition to the above, the utilisation of the fund is restricted to investment only and it cannot be appropriated or disposed otherwise. - Surplus, if any, will be listed as the central government's responsibility reserve for subsequent year. - The Bureau of Labour Insurance is responsible for underwriting, benefits payment, accounting, fund management and investment.
Taiwan	PSPF	- To secure and stabilise the income for retirees so as to facilitate recruitment, boost morale, take care of the aged and their dependents, and establish a sound and solid retirement system - To ensure a sustainable operation of its inexhaustible resources - To mitigate risk, practice professional management, elevate efficiency, and raise investment performance - To formulate a nimble, flexible investment strategy in pursuit of stable long-term returns - To take care of the retirees as well as to pay equal attention to the welfare of the incumbent civil servants - To invest in bonds, deposits, welfare loans, loans to government and other government-approved investments - Actuarial assessments are used by relevant units as reference for the setting of future pension policy and contribution rate adjustments. - Equal importance is placed on its security and proftability, as well as domestic and international economic conditions, so that the system can last forever. - The PSPF management board established relevant parameters for investment management.

Source: Annual reports

As we argued in section 2, the accumulation of significant public debt to conduct current account sterilisation policies or inflation control policies and the socialisation of the losses of failed industrial policies (i.e. bank bail outs) all results in implicit or explicit pressure on institutional vehicles like pension reserve funds to absorb large amounts of low-yielding government bonds.

Such alternative uses of pension reserves have been documented to lead to negative performance on average in 22 different countries (Rajkumar and Dorfman, 2011). Musalem and Palacios (2003) warn that non-pension uses of reserves should be approached with great care.

Finally, Das et al. (2009) insist that whatever the legal structure of the reserve fund, it is paramount that the independence of operational management be guaranteed, so as to limit political interferences. Lane (2001) also stresses that politicisation of investment decisions should be avoided.

3.3.2 Lack of independence

However, East Asia's reserve funds are not independent from political influence as

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Table 8: Pension reserve funds objectives (continued)

Country	Reserve Fund	Declared Goals & Objectives
China	NSSF	- To help the government meet social security spending needs at the peak of ageing and manage individual account assets for nine provinces - To manage the capital allocated by the central government, the capital and equity assets derived from sales of state-owned shares and capital raised by other methods - To select and entrust investment managers and custodians with assets and to monitor the investment operation - To engage directly in investment of assets to the extent permitted by PRC laws and regulations - To earmark funds in a way jointly designated by the Ministry of Finance and Ministry of Human Resources and Social Security - To perform other duties assigned by the State Council - To maintain a long-term philosophy focused on value and responsibility - To increase revenue while controlling risk within a prudent safe investment framework - The investment strategy is formulated and implemented by the National Council for Social Security Fund.
Korea	NPF	- To provide benefits which stabilise the livelihood of members and promote the welfare of the nation - To pursue a sustainable level of profit that achieves the stability of the fund and the national economy - To maximise profit to maintain and increase the real value of the fund without harming stability - To promote long-term financial soundness through financial recalculation - To contribute to the growth of the economy as a supplier of long-term capital - To invest in social infrastructure and public welfare projects, even though such activities are not as profitable as capital market investments - To ensure sufficient liquidity in the future - To meet the interests of all stakeholders and none other - To improve the investment portfolio by extending the scope of assets - To seek strategic alliances with global players in investment - To outsource fund management to external providers - To expand investment into overseas markets - To diversify investment products to hedge risks - To increase transparency and remain ethical via strict internal controls - To establish a reputation as a world-class professional investor
Korea	GESSI	- To protect and improve the well-being of public servants, in order to improve the efficiency of the workforce - To pay benefits raised from contributions, investment returns and other sources - To invest in deposits, trusts securities and other approved instruments domestically and abroad - The reserve is managed by the Public Insurance Supervisory Board under the supervision of the Ministry of Civil Service.
Korea	GEPS	- To provide a stable standard of living for government employees through pension services, investment, loans and leasing to members, and the operation of resorts and housing - To manage efficiently contributions and benefits and to continue raising financing for member needs - To achieve sustainable growth through fund management - To invest in projects benefitting society - To develop social responsibility and create value - To make competence-based improvements - To strengthen risk management and fund management expertise - To formulate strategic asset allocation containing, among others, views on long-term macro trends, target return and risk - To make tactical adjustments if the portfolio underperforms significantly - To maintain sufficient liquidity so that pension payments are not interrupted
Korea	KTPF	- To maintain a reserve to supplement pension benefits for private school teachers - To stabilise pension financing in the long and mid-term by maintaining profitability - To maintain and increase the real value of the fund - To formulate an ALM-centric policy and asset management practice that strengthens performance - To enhance welfare to members and their survivors, as well as the development of the national economy and financial markets - To enhance organisational efficiency and member satisfaction - To maintain a diversified portfolio and manage it transparently - Guidelines are prepared by the asset management committee.

Source: Annual reports

their multiple uses, including for short-term policy purposes, discussed above clearly ilustrate.

For example, Korea's NPF management committee is directly supervised and chaired by the Ministry of Health, Welfare and Family Affairs. Likewise, Japan's GPIF has no governing board to separate help public policy and asset management. Ambachtsheer (2007) argues that the Ministry of Health, Labour and Welfare in Japan exerts control over the asset allocation mix, risk budget and discount rate .

Similarly, China's NSSF and its governing body are considered legally independent from government and ministries, but its chairmen have traditionally been high level officials from the Chinese Communist Party and Ministry of Finance, while other management staff has been appointed or nominated by the State Council. The supervising Ministry of Human Resources and Social Security determines the asset

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allocation. Similar examples can be drawn from Japan's MAAs, or Taiwan's LIF, NPIF and LRF which are all managed by the Bureau of Labour Insurance, a government organisation.

Thus, while pension reserve funds should be a dedicated instrument to meet the long-term objective of managing public pension liabilities, the independent institutions that would be necessary to ensure that they are actually used for this purpose do not exist.

3.3.3 Long-term risks and investment objectives

Because most East Asian public pensions pay an annuitised stream of benefits with some kind of indexation, public reserve fund is typically exposed to longevity, inflation and wage growth risk.

With little to no annuitisation in corporate pensions in the region (see section 4), pension reserves are in fact the main source of insurance against longevity risk in East Asia. For pension reserves, this risk is significant because retirement ages tend to be low and longevity assumptions used in actuarial reviews unreliable (see Cass Business School, 2005; Moo, 2009; Oksanen, 2012, among others). Nevertheless, longevity risk is not explicitly taken into account in these reserve funds (Antolín, 2007).

Inflation risk can also impact the liability of the reserve adversely depending on the state of the business cycle (Schwartz, 2012). The pensions paid by Taiwan's reserves are a case in point, since they guarantee a minimum real interest rate. However, the example of Japan suggests that high inflation is not necessarily an outcome of the East Asian development model when combined with population ageing, as discussed on section 2.3.2.

It remains that the existence of pension reserves also provides the public sector with the opportunity to manage those risks.

However, the investment objectives of pension reserves in East Asia only address the need to manage liabilities indirectly:

- Japan's GPIF aims to beat wage growth and achieve benchmark returns in each asset class at the desired aggregate risk level (Ministry of Health, Labour and Welfare, 2009). Historically, the GPIF has had low-cost and low-risk approach Ambachtsheer (2007) but has recently been discussing the inclusion of new asset classes in its investment set to improve performance.
- China's NSSF aims to beat inflation in the long run, but also to exceed an investment benchmark in the short run (Zheng, 2011). However, China's NSSF does not officially have liabilities. Even though it is supposed to act as a pension buffer, it has not backed up recent provincial obligation shortfalls. Thus, while it acts as asset manager to nine Chinese provinces, its mandate remains partly *ad hoc* (see Zheng, 2011; Leckie and Xiao, 2012, among others).
- Korea's NPF is return-seeking in the short run, while it also aims to preserve fund

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value in real terms over the long period (National Pension Fund, 2011).

Thus, pension reserves are typically not used to manage the liabilities that they and the public sector are exposed to in the context of PAYG pension systems. The management of reserve funds suffers from significant flaws, including the absence of well-defined investment objectives aimed solely at managing the reserve fund in the context of the pension system's liability and the influence of the public sector over the management of the reserve fund in order to achieve unrelated and potentially contradictory objectives linked with economic development or industrial policy, as discussed in 3.3.2.

As a result, reserve funds have loosely defined objectives and no precise assessment of their liabilities.

Understanding a reserve fund's liability is also complicated by the continuous but uncertain process of reforming public pensions and introducing new accounting or actuarial standards.

In the absence of well-documented liabilities, and given the governance challenges mentioned above, long-term investment objectives are set very loosely and much more attention is given to short-term objectives. In this context, loss aversion plays an important role and tends to steer investment decisions towards suboptimal strategies.

Before discussing current investment management trends at East Asia's pension reserve funds in section 3.5, we review their short-term constraints, which must also be taken into account to develop adequate investment solutions.

3.4 Ill-defined short-term constraints

Like other vehicles with implicit pension liabilities, reserve funds must not only set long-term investment goals but also operate under a number of short-term constraints. These constraints should address amongst other things any systemic issues (regulation) and risk preferences.

However, East Asian reserve funds are found to have rather ill-defined short term constraints, if any official constraints at all, when it comes to investment policy. Along with the absence of clearly defined long-term objectives, this state of affairs precludes the definition and development of adequate investment solutions for reserve funds.

Next, we detail the funding rules and investment restrictions of reserve funds in East Asia.

3.4.1 Funding rules

Pension reserves undergo actuarial reviews every three to five years, the results of which are often not made public. Their funding ratio objectives are typically expressed as a multiple of annual benefit obligations, but this multiple leaves a significant grey area

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and does not appear to be set or revised in a systematic manner.

In effect, the funding rules of East Asia's reserve funds prevent them from developing a comprehensive view of their assets and liabilities. Because their funding goals often omit any actuarial assumptions, there is no legal requirement for these funds to improve their management practices.

For example, funding levels for Japan's GPIF are currently set at five to seven times annual benefit expenditures. Since 2004, they are to be revised gradually and only one year of benefit expenditures is expected to be left on reserve by 2100 (Ministry of Health, Labour and Welfare, 2009).

Korea's NPF, is estimated to have spent its surplus by 2060. Meanwhile, it is required to keep a funding ratio above 200% of annual expenditure (Moon, 2009).

The Taiwanese LIF aims to achieve a surplus of 20 years' benefit payments (Chiu, 2004),

Chinese USI funds do not have a target surplus (Zheng, 2011).

Funding ratios based on proper asset-liability assessments are thus inexistent in reserve funds in East Asia.

3.4.2 Investment restrictions

Investment restrictions further constraint the investment choices available to reserve funds to meet their long-term objectives. Restrictions can be statutory, i.e. stipulated in law, or self-imposed, i.e. defined within the investment policy of the fund. Restrictions can also affect asset allocation via either constraining weights in certain asset classes, or via specifying the types of investment instruments allowed.

Statutory asset allocation weights restrictions apply only in the case of China's NSSF, while in other cases such restrictions are self-imposed as shown in table 9.

However, constraints on the types of investment instruments are common. These may restrict or ban the use of certain instruments and usually apply to alternatives, derivatives, lending and borrowing.

Such restrictions in Japan apply only to internally managed assets, whereas there is no evidence that they apply in Korea. In China and Taiwan, such constraints may be statutory. Finally, restrictions may apply to the weight of a single stock or fund, as they do elsewhere in the world.

Thus, East Asia's pension reserve funds have few short term constraints guiding the investment management process. Funding constraints expressed as a multiple of annual benefit obligations ignore the dynamic profile of the reserves' liability process.

The implementation of proper funding ratios (the value of the pension scheme's assets over its accrued-to-date liabilities) would significantly improve outcomes since, as Martellini and Milhau (2009) argue, it is not so much the presence of short-term funding ratio constraints that is

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Table 9: Pension reserve allocation rules, 2011

Country	Fund	Fixed Income			Equity			Statutory Constraints
		Total	Domestic	Int'l	Total	Domestic	Int'l	
Japan	GPIF	..	60-75%	2-15%	..	5-20%	5-15%	None
Japan	Chikyoren[1]	..	54-64%	0-20%	..	4-14%	1-21%	None
Korea[2]	NPF	Below 60%	Below 60%	Below 10%	Min 30%	Min 20%	Min 10%	None
China	NSSF	Min 40%[3]	..	Max 20%[4]	Max 40%	..	Max 20%[4]	Weights and instruments
Taiwan	LRF	..	12-30%	7-18%	..	20-40%	7-20%	Instruments
Taiwan	NPIF	..	..	0-45%[5]	..	..	0-45%[5]	Weights and instruments
Taiwan	LIF	..	..	0-45%[5]	..	..	0-45%[5]	Weights and instruments
Taiwan	GESSI	..	..	..	0-40%[6]	..	..	Weights and instruments

1 - The Chikyoren is one of several MAAs in Japan and is used as an illustrative example of a typical MAA's asset allocation bands.

2 - Data refers to NPF's target in 2016. In the intermediary term, it sets annual asset allocation targets only.

3 - Figure includes bank deposits, treasury bonds and policy financial bonds.

4 - Figure comprises total international exposure for equities and fixed income combined.

5 - Figure comprises total international exposure.

6 - Figure refers to stocks, ETFs and equity funds, among others.

7 - The table excludes other, sub-asset-class specific allocation bounds.

Source: Annual reports

costly for pension funds as their reluctance to implement risk-management strategies that are optimal given such regulatory constraints.

Moreover, the frequent absence of formal constraints on asset allocation decisions is striking given the observed allocation choices that we discuss in section 3.5. Indeed, the majority of pension reserves is invested very conservatively and in all likelihood sub-optimally. Despite the theoretical freedom to design asset allocations, other considerations lead to very high allocations to low-yielding government bonds.

3.5 Investment Management

Without well-defined long-term objectives in line with the reserve's actual liabilities and without clear short-term constraints, we can expect East Asia's reserve funds to have difficulties adopting investment solutions fitting to their nevertheless significant role in the region's pension systems. Next, we review the investment governance and asset allocation choices made by reserve funds in East Asia.

3.5.1 Inadequate Investment Governance

With limited independence and a lack of ring-fencing of their assets, the investment governance of East Asia's reserve funds is documented to be poor (Palacios, 2002). We also know that poor governance impairs efficient risk-taking (Phan and Hegde, 2013) and that a decision-making process relying on qualified investment committees is preferable.

Japan's GPIF decision-making process revolves around the fund chairman, who is also in charge of asset management, while the investment committee has merely an advisory role (Ambachtsheer, 2007). At some of Japan's Mutual Aid Associations

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(MAAs), the establishment of an investment committee is deemed desirable but not mandatory. Furthermore, Dorfman (2011) highlights the importance of expertise as an appointment criterion, yet qualification requirements for staff are unclear.

China's NSSF's investment committee, in contrast, determines the strategic asset allocation, the annual and quarterly investment plans. Decisions are made through majority voting, while the chairman reserves the right to veto.

Korea's NPF's investment committee also sets a better example - it is comprised of a chief investment officer and has functional heads. The committee meets monthly, while a separate committee focuses on alternative investments.

The Taiwanese PSPF has management and supervisory boards, but lacks an investment policy.

Risk budgets in East Asia's pension reserves are rarely defined. As we argued above, lacking an explicit consideration of risk in spite of return-seeking objectives incentivises excessive risk-taking (Severinson and Stewart, 2012) and possibly suboptimal decisions about risk exposure.

Most East Asian reserve funds focus only on risk measurement, which is only the first step in comprehensive risk management. [11] Even though risk measurement without a corresponding mitigation strategy leads to insufficient understanding of portfolio dynamics.

Risk management at pension reserves thus relies primarily on diversification and portfolio rebalancing.

3.5.2 Asset allocation and diversification

Asset allocation decisions in East Asia's reserve (and other) pension funds remain biased towards local investments and fixed income as shown on table 28. The home bias is well documented in financial literature (see Kang and Stulz, 1997; Lewis, 1999; Coval and Moskowitz, 1999, among many others), however it is not clear whether this bias is in the best financial interest of reserve funds (Severinson and Stewart, 2012).

Indeed, public pension systems are largely driven by national factors that are likely to impact local asset returns as well. It would then seem logical that funds seek to mitigate their national exposure by following a broad international diversification strategy, but this is hardly the case in the region.

Still, PRFs not only have the incentive, but also the scale and ability to invest internationally. The persistence and extent of the home bias in their investment choices suggests that international diversification has a lot to offer to such actors.

According to Blundell-Wignall et al. (2008), the global trend with regard to the asset allocation of PRFs is towards an increase of overseas investments. Some funds, however, have strict instructions to invest domestically, often for politicy motives, such as stimulating a certain class of assets. For

11 - For example, Japan's GPIF uses a GARCH model, while Korea's NPF uses VaR measures. The NSSF's long-term risk policy is expressed in terms of a percentage return, while in the short-term, it has a VaR-based risk budget (Zheng, 2011).

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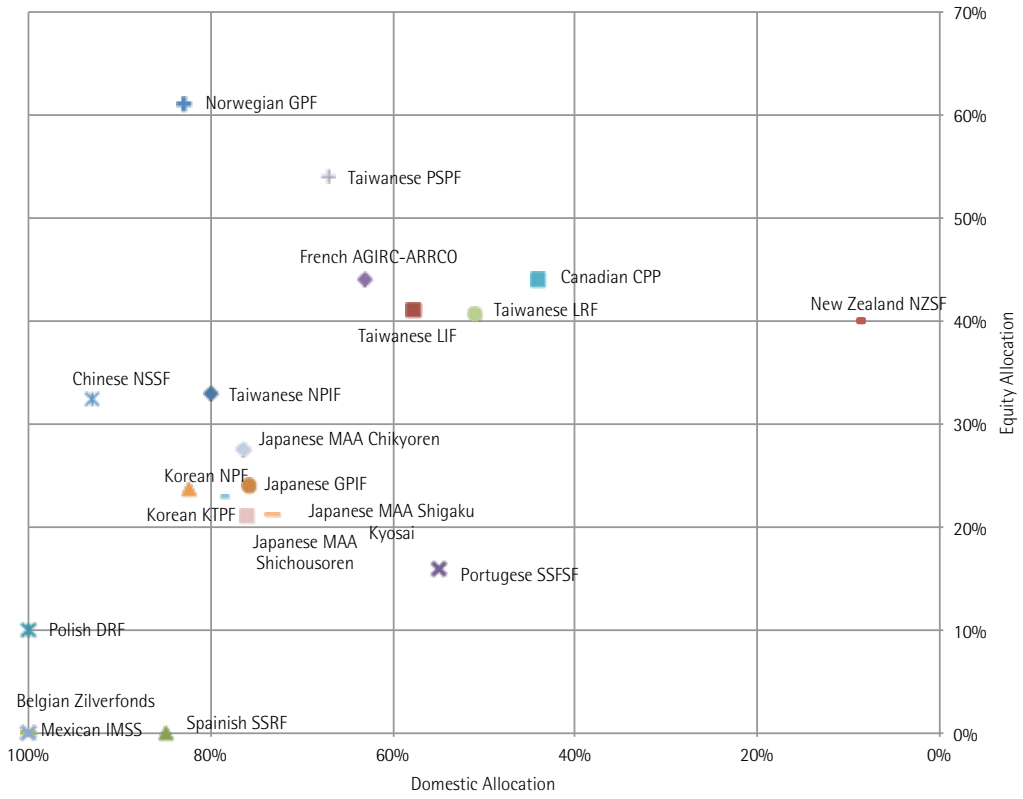
Figure 28: Observed domestic and fixed income bias of pension reserve funds, c.2010



Source: Annual reports and OECD

Table 10: Observed asset allocations of pension reserve funds in East Asia, c.2010

Country	Fund	Fixed Income			Equity			Alternatives	Cash
		Total	Domestic	Int'l	Total	Domestic	Int'l		
Japan	GPIF	72%	63%[1]	9%	24%	13%	11%	..	4%
Japan	Chikyoren[2]	71%	61%	10%	27%	15%	12%	..[3]	1%
Korea	NPF	68%	64%	4%	24%	18%	6%	8%	..
China	NSSF	51%	..	..	32%	26%	6%	16%[4]	1%
Taiwan	LRF	35%[5]	19%	16%	41%	33%	8%	..	24%

1 - Figure includes domestic FILP bonds.

2 - The Chikyoren is one of several MAAs in Japan and is used as an illustrative example of a typical MAA's asset allocation.

3 - It is known that the Chikyoren invests in real estate and derivatives but figures are not available.

4 - Figure comprises industrial sector direct investments.

5 - Figure includes loans.

Source: Annual reports

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instance, the NSSF has a mandate to invest its assets in the domestic private equity market, even though it is unclear whether it is in the best interest of pension financing. Severinson and Stewart (2012) make this point for Swedish reserve funds.

However, an evolution of the asset allocation choices of reserve funds is noticeable in the region:

- **International versus local assets**: East Asia's reserve funds have the scale and ability to invest internationally. Thus, there is a trend towards increasing international diversification. Up until 2003, Korea's NPF was invested almost exclusively in domestic fixed income, but is now diversifying rapidly (see table 10). Taiwan's pension assets evolved from almost 100% invested in domestic deposits only two decades ago to an increasingly well-balanced allocation. Korea's KTPF did not make foreign investments before 2008. China's NSSF has been investing internationally since 2006.
- **Alternative versus traditional assets**: Both Korea's NPF and China's NSSF have strong commitments to alternative investments, while Taiwanese funds are known to hold a lot of cash. Korea's NPF introduced alternative investing in 2003, while the KTPF started expanding into this asset class more recently. The NSSF has been allowed to deal in the asset class since 2008.
- **Active versus passive management**: Most of Japan's GPIF's assets are handled in passive indexed mandates, but a trend to move into more active mandates appeared in 2009. In contrast, efforts in Taiwan as of 2012 revolved around increasing passive management, driven by the growing scale of pension reserves. Elsewhere in China, in an effort to preserve capital, USI pools are banned from investing in anything else than cash or government paper. The only sign of efforts to improve returns is seen in several provinces outsourcing part of the investment portfolio to the NSSF since circa 2012 (Mills, 2012).
- **Internally versus externally managed assets**: While the GPIF's portion of internally managed assets has doubled lately, it still pales in comparison with Korea's NPF, which maintains an almost equal split of internal and external management (National Pension Fund, 2011). Arguably, through more internal management, the fund has amassed more knowledge in global asset management than it would have otherwise, allowing it to take on research-intensive asset classes such as alternative investments. The NPF introduced external management only in 2000, whereas the GPIF has been able to outsource since 1986 (Palacios, 2002). China's NSSF invests directly 58% of its assets (Leckie and Xiao, 2012).

The hypothesis of a negative demonstration effect of the GPIF's allocation choices and subsequent performance could explain the evolution of approaches and practices in Korea, Taiwan and China.

Hence, our sample of East Asian reserve funds can be split into two groups: Japanese

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and Korean funds have a very strong fixed income bias. In contrast, Taiwanese and Mainland Chinese reserves have moved from similarly fixed income focused allocations to more balanced choices.

However, each attempt to improve diversification is done on a piecemeal basis and relies on potentially inadequate approaches. In particular, as with numerous institutional investors, the evolution of Korean and Taiwanese reserves may be diversification 'in name only' if multi-asset class strategies prove not to be resilient to significant market downturns.

Moreover, two important phenomena affecting asset allocation for some reserve funds deserve highlighting:

- Asset allocation choices dictated by short term public policy objectives can lead to very large positions dedicated to domestic public debt securities yielding very low nominal returns and often negative real returns (e.g. GPIF, China's NSSF and USI).
- In a variant of the classic debt overhang problem (Myers, 1977), reserve fund managers that find themselves obliged to absorb large amounts of low-yielding public debt can respond by investing the remaining allocation in high-risk assets, safe in the knowledge that any losses will be socialised, while they will benefit from any excess returns. This is all the more likely if the reserve fund in question has a return target. Thus, China's NSSF typically suffers investment losses in its fixed income and even equity portfolios, but invests aggressively in private equity to deliver positive aggregate returns.

As argued above, in the absence of clearly defined long-term objectives and transparent and well-understood short-term constraints, the required asset allocation for East Asia's pension reserves is difficult to derive.

3.5.3 Performance

The differences between the asset allocation choices of the two groups described above are reflected in their investment performance.

Using available data, figures 29 and 30 compare investment performance on a five-year and nine-year basis. The performance of Japan's GPIF is found to reflect that of its asset allocation bias and, in turn, that of the Japanese economy.

Compared to the GPIF, Korea's NPF achieves a much more attractive risk/return trade-off as shown on figure 31. The very high performance of Korean equity markets over the period is an important factor for this seemingly successful result (see figure 22).

Despite differences in outcomes, it remains that the cycle of systematic and parametric reforms in reserve funds across the region has not helped to prioritise the role of asset income.

While reserve funds officially aim to adjust their asset allocation following actuarial reviews, this approach is not always reflected in practice. In the region, actuarial

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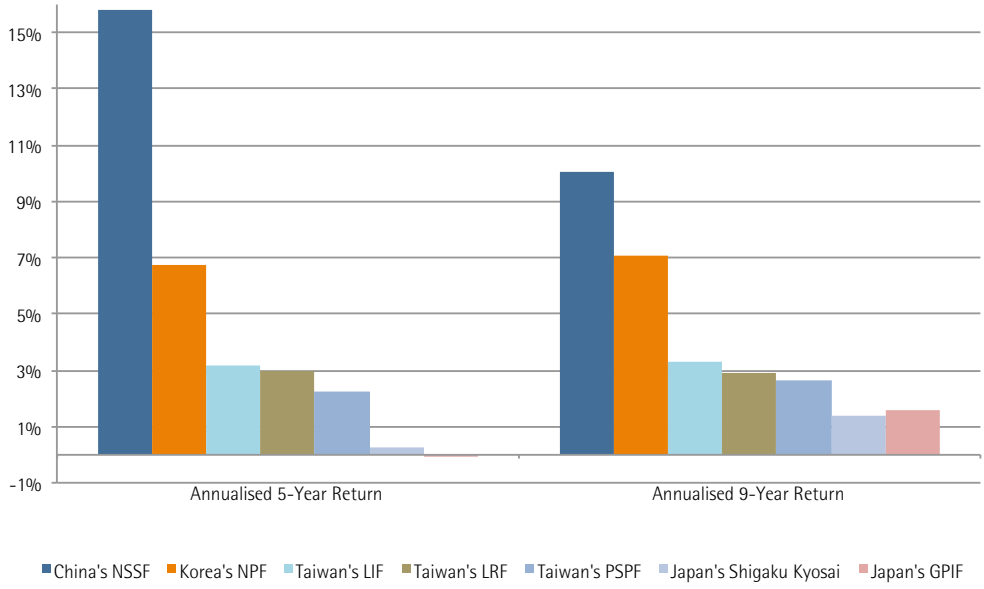
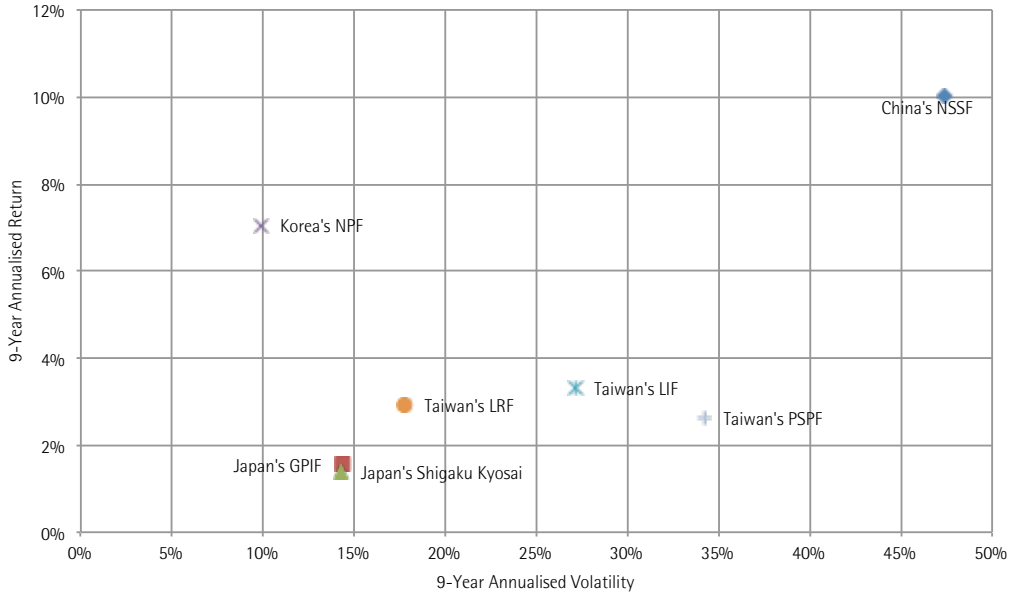
Figure 29: Five and nine-year annualised returns of East Asia's reserve funds, 2002-2010



Source: annual reports, authors' computations

Figure 30: Nine-year annualised returns and volatility, 2002-2010



Source: annual reports, authors' computations

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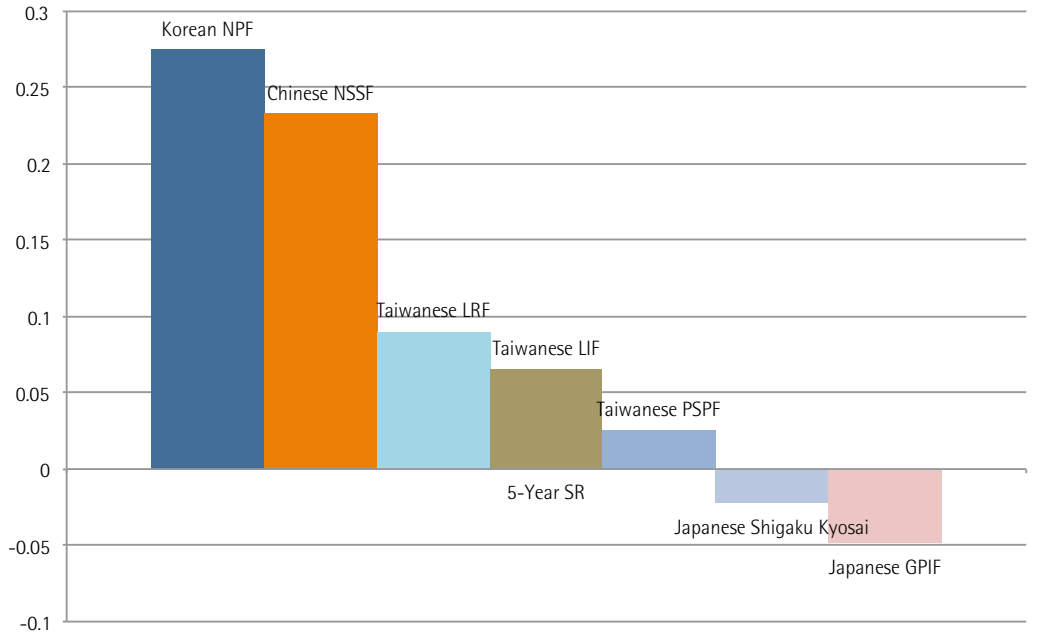
Figure 31: Sharpe ratios of East Asia's pension reserves, 2005-2010



Source: annual reports, authors' computations

reviews seem to lead to contribution rate increases rather than changes in asset allocations. The legal frameworks for Taiwan's LIF and LRF offer a good example.

Investment management approaches in pension reserve funds have undeniably evolved and improved over the past decades. Korea and China in particular seem to have learned from the Japanese case and to have made attempts at better diversification and investment governance.

However, the management of the reserves remains too dependent on the conditions of the domestic economy, and following multiple objectives is not necessarily consistent with the support of the public pension system.

Thus, improvements are possible on several fronts, from better governance to the implementation of proper risk management techniques.

3.6 Improvements

The discussion above suggests a number of straightforward points to improve pension reserve funds in East Asia.

Best practices for pension reserve funds are fairly consensual in the literature. Guidelines have been published by theInternational Social Security Association (2005) in the context of social security reserve funds. Das et al. (2009) offer a short and clear summary of state-of-the-art practices in setting up SWFs, with some specific considerations for PPRFs. They discuss both the governance and investment side. Similar recommendations, with an emphasis on governance, can be found in Truman (2008). Two documents

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Table 11: Governance Success Factors

Factor	Description
Core Input Factors	
Mission Clarity	Clear definition of mission and the commitment of stakeholders to the mission statement
Effective Resource Allocation	Support for each element in the investment process with an appropriate budget considering impact and required capabilities
Leadership	Leadership at the board and investment committee level, with the key role being the investment committee chairman
Strong Beliefs	Strong investment beliefs commanding fund-wide support, which align with goals and inform all investment decision-making
Risk Budget Framework	Risk budget aligned to goals and incorporating an accurate view of alpha and beta risk, thereby framing the entire investment process
Fit-for-Purpose Manager Line-Up	Effective use of external managers, governed by clear mandates, aligned to goals, selected based on fit-for-purpose criteria
Exceptional Factors	
Investment Decision-Maker	Use of a highly investment competent investment function tasked with clearly specified responsibilities and clear accountability to the investment committee
Required Competencies	Selection of a board and senior staff according to numeric skills, capacity for logical thinking and the ability to think about risk in the probability domain
Effective Compensation	Compensation practices used to build bench strength and align actions to the mission, with different strategies working according to fund context
Competitive Positioning	An investment philosophy and process framed by reference to the institution's comparative advantages and disadvantages
Real-Time Decisions	Utilisation of decision-making systems that function in real time and not calendar time
Learning Organisation	Learning culture which deliberately encourages change and challenges the commonplace assumptions of the industry

Source: Clark and Urwin (2007).

by the World Bank, Musalem and Palacios (2003) and Rajkumar and Dorfman (2011), have an in-depth collection of papers describing the state-of-the-art of governance and investment as applied by practitioners in PPRFs.

3.6.1 Improving Governance

Independent governance structures are absolutely necessary to allow the design and implementation of investment solutions that meet the objective of funding all or part of PAYG pension liabilities.

Table 11 summarises the main success factors for the governance of institutional funds, which apply widely to reserve funds in East Asia. A clearly defined mission and commitment to meeting well-identified objectives is pivotal for pension reserve funds to play their role supporting the public pension system.

With proper governance, reserve funds should define and estimate their liabilities and set long-term investment objectives. Short term constraints also play an important role and must be clearly defined and understood.

Appointments and personnel

The appointment process for the governing board and the responsibilities of members should be clearly defined (Yermo, 2008). One important criterion for becoming a board member should be expertise (Dorfman, 2011).

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Appointments should as much as possible avoid the risk of political interference and other conflicts of interests, which should be disclosed and managed. Independent nomination committees can play a role in improving practices, although one should be wary of giving too much importance to corporate governance trappings. The priority should go to creating mechanisms for the transparency and public scrutiny of decisions.

Kim and Stewart (2011) remarks that there might be a trade-off between expertise and democracy, as representatives of civil society do not usually have knowledge and experience in investment management.

Conflicts of interest are also a serious matter. The adoption of a code of conduct and disclosure requirements can mitigate these risks (see for instance Parihar, 2011).

Independence of management

Isolating the investment decision in a separate structure is a way to ensure the independence of financial management. However, Das et al. (2009) insist that whatever the legal structure of the fund, it is paramount that the independence of operational management be guaranteed, so as to limit political interferences described previously. Lane (2001) also stresses that politicisation of the investment policy must be avoided.

Ring-fencing

Yermo (2008) suggest that actual legal separation is not as essential as "ring-fencing" i.e. the guarantee that the assets of the funds will only be used for the payment of pensions. This is the case for most PRFs in the rest of the world (e.g. Canada).

Examples of the involvement of the public sector to use pension reserves include current account sterilisation vehicles or buyer-of-first-resort of public sector debt. This is detrimental to the goal of designing asset allocations to meet long-term pension objectives, especially if these require significant asset income to help bear the cost of population ageing.

Controls and audits

Regular reporting of activities should be enforced between the investment entity, the board, and the supervisory body (e.g. Ministry of Finance). Periodic internal and external audits should be performed to ensure that both the governance and the investment processes are adequate and follow the mandate (see for instance Gandolfo, 2011).

3.6.2 Investment

Setting clear investment rules

The establishment of a clear-cut governance process and the maintenance of independence are facilitated by fully defined investment objectives in terms of liabilities to match, maturity and risk budget.

Das et al. (2009) recommend the identification of a clear investment horizon, so as to ease the use of ALM techniques.

Acceptable risk levels also need to be clearly defined. The typical way of accounting for downside risk is the incorporation of

3. Improving Reserve Funds

a maximum drawdown or maximum loss constraint, or a value-at-risk limit.

The joint management of these long-term objectives and short-term constraints can be accommodated by asset-liability management (ALM).

Adopting proper ALM practices

There is no evidence of widespread asset-liability matching (ALM) in East Asian reserve funds. One survey mentions that only 25% of 95 surveyed institutional investors in Japan, South Korea, Taiwan, Hong Kong, Singapore and China consider matching liabilities their main challenge (**?**).

In a survey conducted by Ducoulombier et al. (2012), 92% of respondents consider that implicit liabilities of sovereign wealth funds (including reserve funds) should be taken into account, and 70% agree that the ALM framework provides a better understanding of optimal investment policy and risk management practices.

However, for ALM to be applied, a number of parameters need to be defined, such as the actual liabilities and risk budgets.

Furthermore, Das et al. (2009) recommend the identification of a clear investment horizon. Dynamic asset-liability management strategies can be designed once a clear objective, maturity and risk budget have been set.

Martellini and Milhau (2010) propose an adaptation of a modern liability-driven investment (LDI) framework to the SWFs context. They show that the optimal asset allocation relies on three building blocks: a liability-hedging portfolio (LHP), to match the actual liabilities; an endowment-hedging portfolio (EHP), to deal with the risk to the fund's endowment stream; and a performance-seeking portfolio (PSP), which has the explicit objective of maximising the risk-reward ratio. The standard approach relies solely on the PSP and leaves out the two other fundamental parts of the strategy. The LHP naturally takes into account the horizon of the liabilities, which allows the strategy to evolve as the payout date approaches.

3.6.3 A holistic lifecycle approach

Finally, the evidence reviewed in section 2.2.1 about the increasing cost of population ageing suggests that only a holistic, multi-generational approach to meeting the combined liabilities of the social security and pension system makes sense. Because of their size and systemic nature, pension reserves, in tandem with social security reserves when they exist (e.g. China) could be instrumental in meeting the investment objectives necessary to preserve fiscal stability and the social contract.

A national balance sheet approach

We know that in an ageing population, lifecycle deficits rise with great predictability: the cross-section (across age groups) per capita consumption profile of the nation ceases to be relatively smooth or flat but instead rises considerably for the elderly as well as the young.

3. Improving Reserve Funds

While the lifecycle deficit of the elderly can be expected to be partly covered by their pension income, including their public pension, it remains that a large part of their post-retirement consumption consists of healthcare financed by public transfers. These transfers are large and cannot necessarily be financed from taxing the workforce. As a consequence, the rise of lifecycle deficits may lead to high levels of public debt (see Sánchez-Romero et al., 2012, for an analysis of the Spanish case using a general equilibrium, overlapping generations model).

We have argued above that some of this debt typically finds its way into pension reserves, where it harms the ability of the fund to develop a proper asset allocation that would match its liabilities. But even if the prescriptions highlighted above were fully implemented and pension reserves could be used to manage public pension liabilities, if would be of little help if the rest of the social security system led the public sector (and eventually society) into bankruptcy.

Hence, one of the constraints that could added to the management of large pension reserves, in tandem with other public finance initiatives, is the preservation of the solvency of the public sector as a whole. Beetsma and Oksanen (2008) provide a discussion in the context of the EU stability growth pact, and Beetsma and Lans Bovenberg (2009), a formalisation in general equilibrium.

Explicit management of longevity risk

In this context, the management of longevity risk, which also affects social security liabilities, is an important point.

The current absence of longevity risk insurance in private pension schemes in Asia is a reflection of a frequent market failure in the absence of mandatory annuitisation. Because longevity risk affect the entire population it is also efficient for this risk to be pooled and spread at the national level, and by the least risk-averse party: the Collective (see Arrow and Lind, 1970).

Hence, defining and managing the longevity risk that affects the public pension and social security system by setting explicit investment income targets at given horizons for reserve funds, while respecting risk budgets could go a long way to counter any detrimental impact of longevity risk on fiscal stability.

Avoiding a free-rider problem between generations

The solution to the intergenerational financing problem created by population ageing is possible assuming no free-riding between generations i.e. intergenerational solidarity.

Ensuring that this is the case requires, again, a holistic approach to controlling the costs of population ageing, especially that of healthcare and long-term care.

It also requires greater visibility and transparency about the costs and benefits

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for each generation in order for a well-informed policy debate to take place, in particular regarding the use of the pension reserve. Indeed, PAYG surplus pension contributions are a collective asset just like governments' annual budgets.

Finance the future

The demographic literature highlights the possibility of a second demographic dividend driven by the investment of pension savings leading to capital deepening and a concomitant increase in labour productivity, labour income and the reduction of the lifecycle deficit of a population.

While the direct allocation of pension assets to investment projects expected to increase the productivity of labour can seem dangerous and in contradiction with the principle of pursing a single objective, another interpretation of the 'second dividend' is to focus on income generation.

Financing income generation through properly intermediated solutions could lead to financing the future of the economy and, by extension, the financial viability of the social and pension system.

Infrastructure investment is a good example of a choice of instruments led by the need to access long-term stable and sometimes inflation-linked cash flows from the point of view of pension funds, but that also has a well documented impact on total factor productivity in the economy.

3.7 Conclusions

In this section, we have reviewed the role of pension reserve funds in East Asia. We find that while they are by far the most significant element of the funded pension sector in the region, they suffer from important flaws.

Nevertheless, the existence of these large reserves represents a **unique opportunity** for East Asia's government to address the un-sustainability of public pay-as-you-go pension schemes resulting from population ageing.

We argue that seizing this opportunity will require making fundamental changes in the way reserve funds have been controlled and managed for the past decades, and adopting investment management processes and tools that will allow pension reserves to achieve what should be their sole objective: to support the public pension system by minimising the burden of pension liabilities on future generations while ensuring adequate public pension provision.

Pension reserves have been a side-product of the rapid demographic transition that has occurred in East Asia. An initial drop in infant mortality in the 1950s led to a larger cohort of newborns who entered the workforce and started contributing to PAYG pensions from the 1970s onwards, at a time when the population of retirees and older workers about to retire was still relatively small.

This creates surplus contributions, which are kept in a dedicated reserve fund, with the

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knowledge that demographic transitions eventually lead to population ageing, and that the number of workers contributing to PAYG systems will decrease, as the number of retirees increases. At that stage, the pension reserve is expected to support the public pension system by making part of the pension payments due.

However, while pension reserves were created to address the issue of population ageing and the sustainability of PAYG systems, the management of these reserves has remained mostly unrelated to that objective. Moreover, the dominant paradigm of pension reserve management consists of the passive adaptation of the pension system to demographic realities as opposed to the active management of a dynamic liability.

Thus, the governments of East Asia expect to have spent almost all of the pension reserves by the middle of this century, while little to no effort is put into increasing investment income from these large pools of assets.

Instead, most of the parameters of the PAYG pension equation are being reshuffled regularly and seemingly independently: parametric reforms lead to changes in contribution rates, benefit levels, accrual formulas or discount rates, while actuarial and other assumptions such as life expectancy and economic growth forecasts spanning 20 to 100 years are adjusted after each review. Moreover, these reforms are often piecemeal and considerably delayed. They also tend to omit addressing any accumulated shortfall before they come into force.

It follows that adequate long-term investment objectives are not set in line with a clear estimation of liabilities, nor are short-term constraints properly defined.

In East Asia, pension reserves exist in the context of pay-as-you-go pensions for private sector workers in Japan, Korea, Mainland China and Taiwan. Specific pension reserves also exist for public workers in Japan, Korea and Taiwan. Hong Kong has no PAYG pension system and therefore no dedicated pension reserve. Mainland China has also created a specific reserve fund dedicated to supporting the pension system but it is funded directly by the state instead of surplus contributions.

In Japan and Taiwan, pension reserves represent 70% of all funded pension assets. In China, reserves are equivalent to 80% of all pension assets and in Korea, the reserve stands for 90% of pension assets.

These large numbers hide two important stylised facts about funded pensions in East Asia. First, pension reserves are large because corporate and occupational pensions are small, as we discuss in sections 4 and 5.

Second, East Asia's pension reserves may be large, even by international standards, but they are not as large as they should be given their level of contributions and promised benefits, as well as the rate of delinquency in certain countries. Moreover, in countries that have initially developed

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primarily thanks to an export-driven model, wage competitiveness remains a key element of economic success and this can be in contradiction with the objective of collecting pension contributions.

As a consequence, pension reserves already exhibit significant shortfalls and part of the benefits paid have to be subsidised by central governments.

Thus, while reserves continue to grow in China, Korea and Taiwan, they should be growing faster if future pension payments are going to be met. In these three countries, all pension reserve funds are known to exhibit significant unfunded liabilities. In Japan, reserves have begun to shrink since 2004. And while the link between demographics and reserves suggests that the latter should eventually peak, it is striking to observe that the Japanese reserve fund, as a consequence of its investment policy, has barely generated any investment income over the past decade.

Clearly, the asset management of pension reserves could be improved to help meet the liabilities of pay-as-you-go systems. Pay-as-you-go pensions in East Asia are the only [12] reliable source of *lifelong* retirement income, since, as we discuss in sections 4 and 5, private pension schemes offer little to no annuitisation. Moreover, given the limited development of private pensions, PAYG systems are often the *sole* source of retirement income for a whole stratum of the population.

It follows that the erosion of pay-as-you-go benefits in the context of parametric reforms cannot continue indefinitely before serious social consequences appear including increasing old-age poverty but also increasing contribution delinquency. Likewise, the continued support of central government to public pension and healthcare systems cannot be extended indefinitely without affecting fiscal stability if costs (lifecycle deficits) of old age are bound increase faster than the capacity to contribute of the workforce.

Instead, adequate risk management can allow reserve funds to invest to maximise the probability to meet their liabilities (liability-driven investing) while controlling risk (risk-controlled investing) and taking their specific investment horizon into account (life-cycle investing).

Our review also highlights a number of stylised facts about East Asia's pension reserve funds.

Long-term objective setting and short-term constraints

- Pension reserves are often given multiple objectives, some of which are unrelated to the supporting the public pension system and may even be in contradiction with that goal. Examples include direct lending to protected industrial sectors, interventions in stock markets and the absorption of large volumes of public debt.
- In effect, pension reserve management is seldom independent from political

12 - We note that other Asian countries such as Singapore, which are out of the scope of the study and have moved aggressively towards developping annuitisation (see for example Fong et al., 2011)

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influence. Direct central government involvement is the norm.

- Pension reserves are exposed to significant longevity and inflation risk but their investment objectives are not necessarily set so that they manage these risks explicitly.
- In general, reserve funds have loosely defined objectives and no precise assessment of their liabilities. Long-term objectives are easily ignored and much more attention is given to short-term objectives. With too much focus on the short-term, high loss aversion dominates investment decisions and can lead to highly suboptimal results.
- East Asia's reserve funds are also found to have rather ill-defined short-term constraints, if any official constraints at all. Along with the absence of clearly defined long- term objectives, this state of affairs precludes the definition and development of adequate investment solutions for reserve funds. Indeed, the short-termism and loss aversion mentioned above play the role of *de facto* short-term constraints.
- Funding rules in particular are expressed in terms of multiples of future obligations which are defined statically and thus leave the dynamic dimension of the fund's liability out of the equation.

Investment management

- The lack of independence highlighted above leads to an equally politicised investment governance. Investment committees and policies, when they exist, are more of an advisory nature and much decision making power remains in the hands of political appointees.
- Asset allocation decisions in East Asia's reserve pension funds remain biased towards local investments and fixed income.
- However, practices have also evolved in recent years. In particular, Taiwanese and Mainland Chinese reserve funds have seemingly learned from the limitations of the Japanese experience. Thus, there is a trend towards increasing international diversification.
- Japanese and Korean funds have a fixed income bias. In contrast, Taiwanese and the flagship Mainland Chinese reserve funds (NSSF) have moved from similarly fixed income focused allocations to more balanced choices. However, each attempt to improve diversification is done on a piecemeal basis and relies on potentially inadequate approaches.
- Alternative investments have also become part of the asset classes used by the Korean and Chinese reserve funds.
- The balance between active and passive mandates is also evolving with a higher proportion of assets dedicated to active managers. The tendency to manage most assets internally has also shifted with the forays into new asset classes by Korean or Chinese reserve funds.

Investment management approaches in pension reserve funds have undeniably evolved and improved over the past decades. However, the management of the reserves remains too dependent on the conditions of the domestic economy, and following multiple objectives is not

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necessarily consistent with the support of the public pension system.

Thus, improvements are possible on several fronts, from better governance to the implementation of proper risk management techniques.

Governance improvements

- Pension reserves need a clear mission and would benefit from full independence from government involvement. In particular, they should not be used to absorb excessive amounts of public sector debt.
- The appointment process for the governing board and the responsibilities of members could be clearly defined and focus on expertise and independence.
- Ring-fencing of reserve fund assets would ensure that this capital will only be used for the payment of pensions.
- Reporting should be improved and periodic internal and external audits should be performed to ensure that both the governance and the investment processes are adequate and follow the mandate.

Risk management improvements

- Next, reserve funds must acknowledge and clarify the liability process to which they are exposed and propose well-documented long-term investment objectives. Their regulator should, in turn, clarify adequate and transparent short-term constraints.
- Reserve funds must develop proper asset-liability management (ALM) and liability-driven investment (LDI) strategies to be in a position to meet their long-term objectives while respecting these short-term constraints.
- Acceptable risk levels also need to be clearly defined. This will allow the implementation of risk-controlled strategies.
- A clear and fathomable investment horizon is necessary. A one hundred year horizon for example, as in the case of Japan's reserve fund, leaves too much uncertainty unmanaged to guarantee time consistency.
- An important part of these reserve funds' objectives should be to improve asset income in order to minimise the intergenerational burden created by population ageing while providing adequate pension income to retirees.

Next, we argue that similar solutions are needed for private pension schemes. However, the importance of these ideas with regard to pension reserves simply springs from their size and role in a region where most savings are still not invested in pension plans, and are thus less likely to provide adequate retirement income to the next generation of retirees.

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4. Improving Defined-Benefit Plans

4. Improving Defined-Benefit Plans

Historically, occupational pension funds have offered defined-benefit (DB) schemes worldwide. The simplest possible `deal' for a DB plan is a fixed replacement ratio applied to final or lifelong earnings. Typically, reserves are set aside in some pension scheme which is backed by the sponsor company.

While many of the public pension systems, including the ones we reviewed in section 3, also provide a form of defined-benefit, few countries still rely exclusively on DB schemes for mandatory or supplementary private pensions. OECD (2011) lists only Iceland, the Netherlands and Switzerland among their sample of countries (OECD and G20). Still, Poterba et al. (2009), who documents the decline in DB plans in the US, show that assets in DB plans, as well as forecast payments, are still expected to increase in the coming decades.

In East Asia, private DB plans exist in Japan, Korea, Hong Kong and very marginally in Taiwan. They remain the dominant form of supplementary private pension plan in the region by asset under management. However, relative to pension reserves or to GDP, they remain a relatively small sector.

Indeed, they are mostly voluntary and pay a final lump sum benefit in the immense majority of cases i.e. they do not effectively provide a pension, that is, a stream of annuity payments during the period following retirement. For example, in Korea, lump sum payouts are the preferred option. Members may qualify for an annuitised payout, but the common annuity term is limited to five years (Ignites Asia, 2013c).

The voluntary nature of private DB plans in East Asia also hinders asset accumulation, i.e. both employers and employees often prefer not to have a pension plan (Blake, 2006). Minimum contributions or benefit levels are rarely set in law. Sakamoto (2010) argues that such plans offer little more than personal savings deposits, and that the latter tend to be strongly preferred to supplementary pensions.

When DB plans do exist, the absence of proper retirement income provision means that longevity risk is seldom a material issue for plan sponsors, while wage inflation risk only extends as far as the retirement date. As a consequence, these plans tend to have loosely defined investment objectives and tend to focus on capital preservation rather than the management of long-term liabilities.

One may in fact regard the majority of corporate and occupational DB plans in East Asia as crude hybrid plans, by which employees must manage lump sum benefits through other means once retired.

Improvements are possible both from the point of view of sponsors thanks to a more efficient management of existing assets and of their funding risk, but also potentially for plan members if a greater degree of risk sharing can be introduced in the post-retirement phase.

4. Improving Defined-Benefit Plans

In what follows, we first discuss in more detail the origins of corporate DB schemes in East Asia (section 4.1). Next, in section 4.2, we review existing schemes, their size and sources of funding before examining the determinants of their liability process and what their long-term investment objectives are in section 4.3. Section 4.4 reviews the short-term constraints that must be taken into account to derive adequate investment solutions. In section 4.5, we briefly review known asset allocation practices and funding levels, and discuss areas of improvement and development in section 4.6. Section 4.7 summarises our main points and concludes.

4.1 The legacy of retirement allowances

Retirement allowances are at the origin of private pension plans in East Asia and help explain their voluntary nature and tendency to be partly unfunded.

A distinction must be made between retirement allowances (RAs) and severance pay: RAs are discretionary lump sums proportionate to seniority and are paid regardless of the reason to leave a position, i.e. they are not a consequence of lay-offs. Severance pay is also typically smaller than RAs. Attempts to reform RA systems in East Asia are mostly incomplete and have created costly and complex retirement contribution systems for employers who are often still expected to pay unfunded RAs even when corporate pension plans exist.

In East Asia, RAs tend to be mandatory for employers. Combined with a certain inertia that is typical of corporate culture with regard to such practices. This partly explains the slow growth of private pension assets in the region.

For example, RAs in Japan have always been mandatory but their pre-funding was never required by law. Fully funded voluntary pension funds were expected to replace the mandatory retirement allowance arrangement, as employers' tax deductions for retirement allowances expired in 2002. Yet, 85% of Japanese employers continue to provide RAs, in addition to national pension contributions and, possibly, a corporate plan (Takayama, 2012a).

Korea's RA system is also mandatory and accompanied by strong tax benefits. However, even after the 2011 reform which made corporate pension plans mandatory for newly established companies (Towers Watson, 2012a), employees continue to receive a mix of retirement allowance lump sum and corporate pension plan. Related tax incentives are expected to expire in 2016 (Towers Watson, 2010). Combined with the newly mandatory nature of corporate pension funds, a decrease in retirement allowance payments can be expected, even though the Japanese example demonstrates that such practices are not easily changed.

In particular, the tradition to pay out a retirement allowance with each job change in Korea (Phang, 2007) was maintained until 2010, and early payments are still allowed to

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purchase a first residence (Towers Watson, 2010).

Of the three East Asian countries that have DB plans, Hong Kong is the only one to have achieved a meaningful transition from mandatory RAs to a mandatory funded system. The establishment of DB (as well as defined-contribution) schemes under the Occupational Retirement Schemes Ordinance (ORSO) was accompanied by tax incentives and a clear link allowing the reduction of RAs if a pension plan is provided.

Next, we discuss the size and development of DB plans in East Asia.

4.2 Corporate DB assets in East Asia

As discussed above, corporate and occupational DB plans in East Asia are mostly voluntary arrangements. Thus, while they represent the second largest pool of pension assets in the region, their growth has been limited and their size pales in comparison to the assets of reserve funds.

Figures 32 and 33 show the relative importance of private DB assets in Korea, Japan and Hong Kong. Small voluntary occupational arrangements exist in Taiwan, but there is no aggregated information on their coverage, nature or assets. Occupational or corporate DB plans do not exist in mainland China .

DB schemes are often underfunded in Japan and Korea, less so in Hong Kong (we return to this point in section 4.5.1), but unlike in most OECD countries, they are not being closed to new members or contributions (Poterba et al., 2009; OECD, 2011).

4.2.1 The preference for DB plans

The fact that the largest group of corporate pension assets in East Asia remains a small pool of DB asset is explained by two mechanisms: one the one hand, there is still a preference for DB plans over DC options amongst large East Asian firms, especially in Japan and Korea. On the other hand, there is a preference for not having a pension plan, especially amongst smaller firms.

The reasons for the continued preference for DB plans are many but the nature of the East Asian firm and the role of the retirement allowance tradition described above are amongst the most significant. Generally speaking, countries like Japan and Korea that have an advanced but strongly integrated industrial structure made of large conglomerates, have tended to continue to prefer DB schemes despite the introduction of DC options for more than a decade in Japan and since 2005 in Korea.

Countries that introduced reforms later (China) but also have a different, much less concentrated industrial structure (Hong Kong, Taiwan) have made or are in the process of making a shift to DC schemes, which we discuss in section 5.

In Japan and Korea, firms that have pension plans also tend to prefer corporate DB plans over DC plans because accounting and funding rules leave them more leeway to

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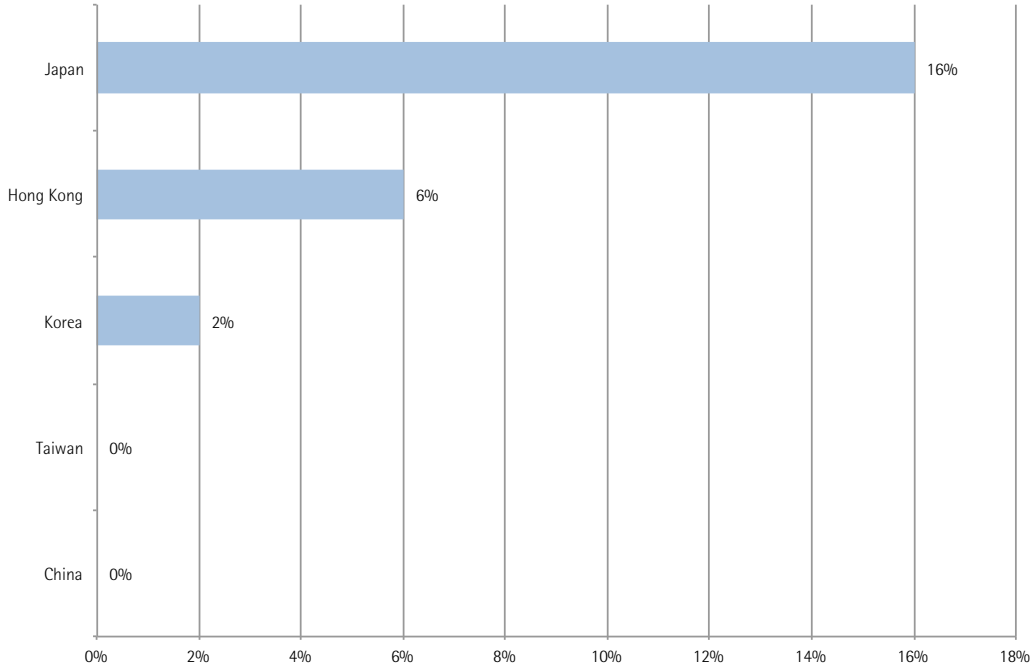
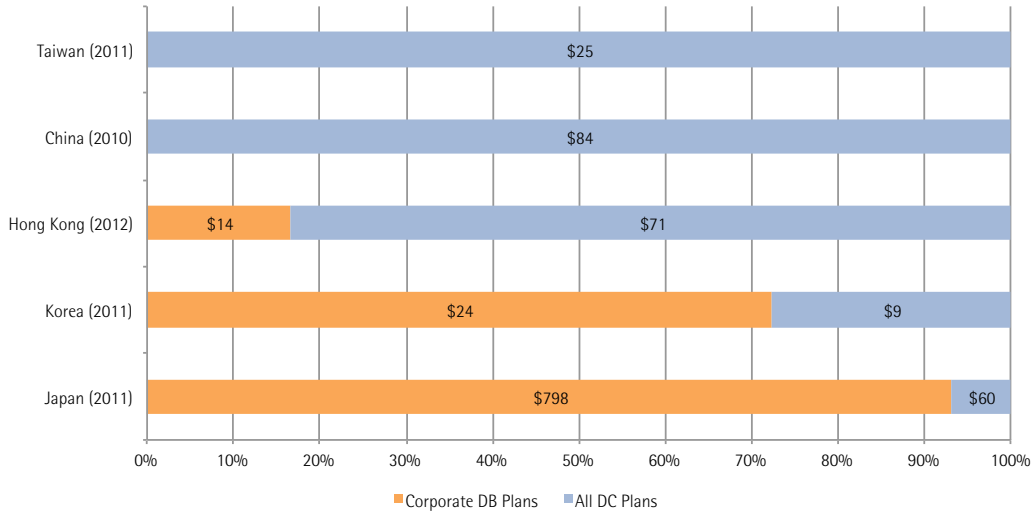
Figure 32: Private defined-benefit schemes assets as a share of GDP, 2011



Source: MPFA

Figure 33: Private defined-benefit and defined-contribution pension assets in East Asia, USDbn



Source: MPFA

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control the size of their pension liability and funding constraints (see section 4.4). Efforts to limit the plan's costs also include mandatory early retirement (usually at 55).

Hence, as figure 32 shows, even in Japan where the majority of corporate plans are DB plans, and where these have existed for decades, total assets have not grown to represent a very significant share of GDP.

Japan is an example of an already ageing country which, despite having introduced the option to shift to DC plans, has remained primarily DB focused, all the while experiencing limited asset growth because neither DB nor DC occupational or corporate schemes are mandatory. Japan has been through numerous reforms of corporate pension, and while the two types of schemes (EPFs and TQPPs) that have historically held most assets are currently being phased out or reconsidered, these assets are mostly being moved to the newest format for defined-benefit corporate pensions in Japan (DBCPs). Japan's total private DB assets however are not growing, as figure 36 illustrates.

Figure 37 shows membership growth in Japanese corporate DB schemes (DBCPs), reflecting the closing of previous schemes and the transfer of some of the existing members. But coverage in corporate pensions in Japan is in fact on a downward trend due in part to a lack of trust in the employer's financial strength (Urata, 2009).

In Hong Kong, DB assets are small as a share of total pension assets, and can be expected to remain so (see figure 34) because most new members enrol in the mandatory DC system, to be discussed in section 5. In fact, ORSO DB membership is decreasing, as shown on figure 37.

In Korea, despite representing two thirds of pension assets, DB schemes are marginal in terms of their size relative to GDP. However, Korea's regulatory move to phase out tax incentives for retirement allowances and make corporate pensions mandatory for new companies appears to have spurred strong growth in the years after reform, as shown on figure 35.

It remains to be seen whether this trend can continue once large corporations have adopted them. In 2012, 16.5% of permanent employees in Korea worked for a large firm (more than 300 employees), excluding the public sector. So far, the introduction of mandatory corporate pensions has confirmed a strong preference for DB plans.

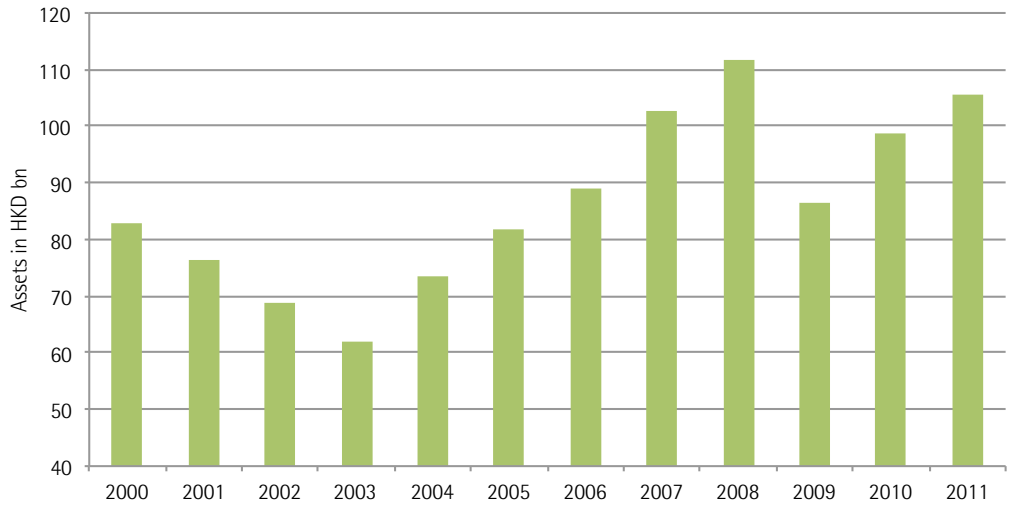
4.2.2 Plan characteristics and funding

Table 12 details the characteristics of DB plans in East Asia. Corporate DB plans in East Asia can be broadly categorised according to the following criteria:

- Voluntary or mandatory: corporate schemes are voluntary in Japan, newly mandatory in Korea (and offering employers a choice of DB or DC provision), and voluntary in Hong Kong (and offering members a one-time choice to switch to the primary DC system in the country).

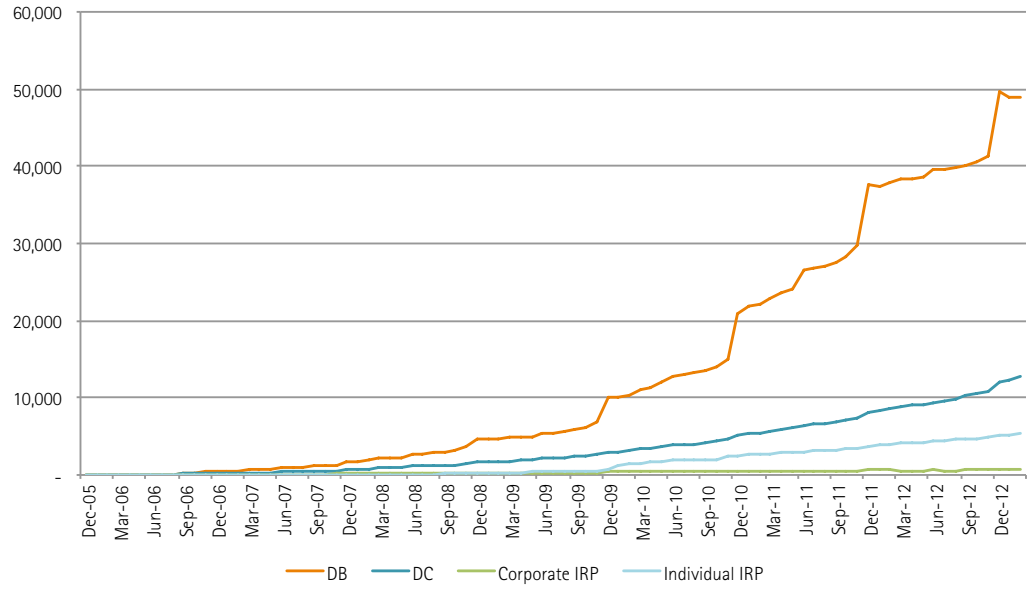
4. Improving Defined-Benefit Plans

Figure 34: DB ORSO plan assets in Hong Kong, 2000-2011



Source: MPFA

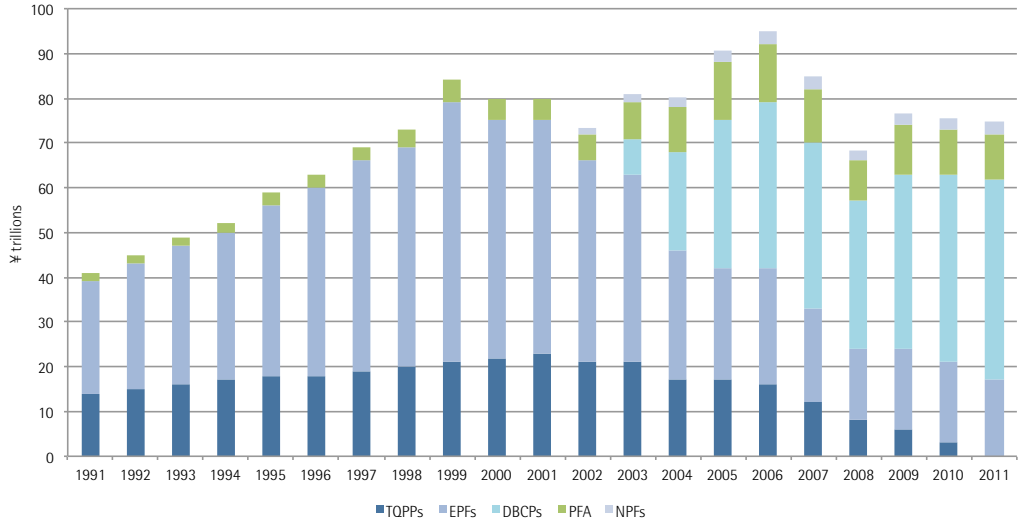
Figure 35: Private pensions assets (DB and DC) in Korea, 2005-2012



Source: Financial Supervisory Service

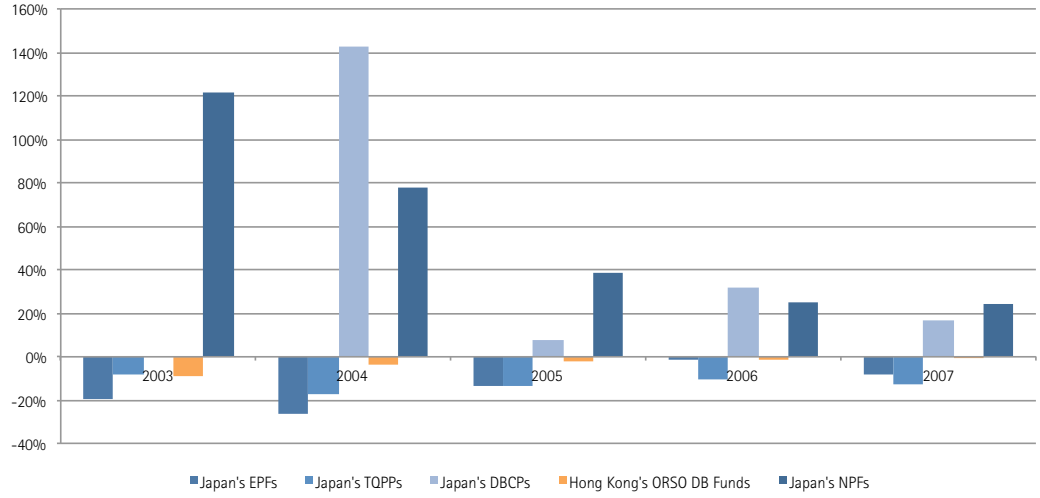
4. Improving Defined-Benefit Plans

Figure 36: Corporate and individual DB plan assets in Japan, 1991-2011



Source: PFA

Figure 37: DB plan membership growth in East Asia, 2003-2007



Source: Urata (2009) and annual reports, authors' calculations.

4. Improving Defined-Benefit Plans

Table 12: Characteristics of corporate DB schemes in East Asia

Scheme	Created	Brief Description	Management	Mandatory	Eligibility
Japan					
Employees Pension Funds (EPFs)	1965	- Fully funded corporate DB pension plans - Set up as separate funds by employer or occupation to manage part of public assets and accummulate additional assets	Private	No	Private-sector employees at workplaces with more than 500 staff
Defined-Benefit Corporate Pensions (DBCPs)	2001	- Fully funded corporate DB pension plans - Set up as separate funds by employer or occupation, or as contracts with financial service providers	Private	No	Private-sector employees
Tax-Qualified Pension Plans (TQPPs) *** in abolition	1962	- Partially funded corporate DB pension plans - Set up as contracts with financial service providers	Private	No	Private-sector employees
National Pension Funds (NPFs)	1991	- Individual annuities which can be purchased by the single or by multiples - Managed collectively by the National Pension Fund Association (NPFA)	Public	No	Self-employed individuals in provinces with at least 1000 subscribers
Korea					
Corporate DB Plans	2005	- Partially funded corporate DB pension plans - Set up as contracts with financial service providers	Private	Yes	Employees at workplaces with at least 5 staff
Hong Kong					
Occupational Retirement Schemes Ordinance (ORSO) DB Schemes	1993	- Fully funded corporate DB plans set up as contracts with financial service providers - Some are supervised by the Mandatory Provident Fund Schemes Authority (MPFA)	Private	No	Plan dependent

Source: Nomura (2010); Takayama (2012c,b); Ministry of Health, Labour and Welfare (2009); Urata (2009); Nomura (2012); National Institute of Population and Social Security Research (2011); Takayama (2003b,a); Ignites Asia (2013c); Ministry of Strategy & Finance (2012); Leckie and Xiao (2012); Zheng (2011); Oksanen (2012); Moo (2009); Shi and Mok (2012b); National Pension Fund (2011); Moon (2008); Seok et al. (2012); Phang (2007); Kim and Moon (2011); Kuo (2012); Takayama (2002); Moon (2009, 2002); Towers Watson (2012b,a); Mandatory Provident Fund Schemes Authority (2012a); Kim (2013); Shao (2010); Ju (2011); Ernst & Young (2012)

- Contracts or funds: contractual arrangements are found in Hong Kong and comprise 70% of Japanese and 100% of Korean corporate DB plans, whereas fund-type arrangements are found in Japan and Hong Kong.

These plans are funded primarily from contributions from employers, although there are no minimum required contributions and major parameters are plan dependent.

In most cases, employees are allowed to make additional contributions, however because the benefit typically depends on an accrual formula rather than the account balance, they have a lesser incentive to do so.

Voluntary contributions are also less likely when the public pension system promises a guaranteed and generous post-retirement income, partly removing the need to manage longevity risk for retirees (Sakamoto, 2010; Mitchell and Piggott, 2011; Chen et al., 2012).

Furthermore, under most corporate DB plan in the region, the employer is expected to absorb any funding shortfall in full (see for example Usuki, M, 2007; Ju, 2011), further removing any incentives to save into the pension scheme for employees.

Ota (2008) and Asian Development Bank (2012) also note that higher sponsor contributions may not always be possible in certain sectors, especially at low points in the business cycle. In Japan and Hong Kong's DB schemes, the benefits of existing retirees can even be reduced under particularly bad financial circumstances and with the approval of the majority of employees.

Hence, the private DB sector in East Asia remains rather underdeveloped despite having the longest history of all the

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corporate and occupational plans available in the region. Assets have grown initially but this growth has typically tailed off after a while and total assets never came to represent a large share of GDP.

Mandatory schemes funded solely by employers and mostly set up as contractual plans with external managers have not led to the creation of a strong corporate pension sector, but instead have become an avatar of the retirement allowance culture that pre-dominated East Asian firms beforehand.

The role of pensions as a source of deferred pay to reward loyal employees and provide long-term incentives to managers has long been recognised in the practice and in the academic literature (see Blake, 2006, for a historical overview of the role of pensions). Corporate pensions in East Asia essentially continue to play this role but not that of providing retirement income to members.

Next, we discuss the determinants of the liabilities and long-term investment objectives of private DB plans in East Asia.

4.3 Liabilities and long-term investment objectives

Generally speaking, the liabilities of corporate and occupational DB plans in East Asia are not made explicit. It follows that long-term investment objectives tend not to be defined and that asset management focuses on capital preservation. For example, Top1000Funds (2012), amongst others, highlights the cash-saving mentality of Korean corporate plans.

As we argued above, the focus of DB plans in East Asia is not the provision of retirement income but the payment of lump sums at or before retirement.

4.3.1 Plan parameters and liability

Plan parameters and actuarial and accounting methods are the main determinants of the liability process. In particular, the combination of a mandatory minimum accrual with the absence of a minimum contribution can lead to unfunded liabilities. Moreover, the issue of the discount rate and method used to model liabilities is much more salient in corporate DB plans because their minimum required funding restrictions (discussed in section 4.4) make their liabilities explicit.

Vesting and portability rules

Table 13 and 14 provide an overview of the relevant parameters in East Asia's private DB plans and the variability of benefit size, composition or accrual rates.

Vesting and portability rules are important parameters for corporate DB plans, as they impact the effective accrual rate and the funding level. Indeed, unvested liabilities normally do not need to be funded and must be forgone by members if they leave the company prior to vesting becoming effective. Any lack of portability fragments benefits and can also affect their accrual.

Vesting rules in East Asia are often unclear and not statutory, although full vesting

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in Japanese and Korean DB plans after three years is common practice. Recent reforms in Hong Kong have improved benefit rights vesting. As vesting and portability regulation becomes more stringent, employers will be under greater pressure to fund their liabilities.

Liability valuation

Private DB plans represent liabilities for the sponsor company that need to be integrated in their balance sheet. The valuation of these liabilities is therefore a contentious issue (see for instance Yermo, 2007). Excessively favourable valuation criteria will make it look like the sponsor company is in a better position than it actually is, but excessively stringent ones will discourage the provision of DB schemes and possibly lead to negative equity.

Forecasting liabilities

In the actuarial calculations to determine the value of accrued liabilities, one first needs to forecast future payments that will have to be made.

Whether benefits are based on final salaries or some weighting of lifelong earnings, one needs to make actuarial assumptions about salary progressions, early exits from the firm, etc., to obtain an economically sensible forecast. More sophisticated benefit structures, offering for instance some indexation of benefits on inflation, may complicate the forecasting exercise.

The hardest parameter to forecast, however, is life expectancy. It has been steadily increasing and adding to the long-term pressure of DB schemes. There is a well-documented tendency to minimise the forecast of life expectancy in DB plans compared to that of the general population (Cass Business School, 2005). While this may reflect actual information about the plans' members, it is also possible that this serves as a way to reduce the estimates of pension liabilities. [13]

However, as we highlighted above, the preference for paying lump sums in East Asia's DB plans can limit the forecasting exercise considerably. In particular, the wage indexation of the benefits does not extent as far in the future and longevity risk is effectively passed back to individuals, creating *de facto* hybridity.

Accrual method

The second major element for evaluating current liabilities is the accrual method, i.e. what future cash flows to be paid to pensioners are worth in present value terms.

The projected benefit obligation (PBO), that takes into account projected salary increases, and which reflects more accurately the perspective of the sponsor company, is the main metric used (Yermo, 2007), including in accounting standards. [14]

The question of the discount rate is central, as long-duration liabilities tend to be extremely sensitive to it, and furthermore, it tends to be used as a target return rate. Hence, discount rates should be consistent with realistic expectations of portfolio performance.

13 - Unexpected improvements in life expectancy could have drastic consequences on the value of liabilities. Antolín (2007) estimates that the net present value of annuity payments could increase by up to 24% for plans with younger members, accounting for improvements in life expectancy at birth of 1.2 years per decade and life expectancy at 65 of 0.8 years.

14 - Sender (2011) discusses this accounting risk and how it relates to the sponsor risk.

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Table 13: Corporate and occupational DB schemes parameters

Scheme	Participants (th)	as of	Recipents (th)	as of	% empl. pop	Employer Contribution	Employee Contribution	Contribution Limits
Japan								
Employees Pension Funds (EPFs)	4,500	2011	2,500	2009	7%	Plan dependent, usually min 2.00%	Plan dependent, usually min 2.00%	Plan dependent
Defined-Benefit Corporate Pensions (DBCPs)	7,300	2011	N/A	N/A	12%	Plan dependent	Plan dependent, max 1/2 of total contribution	Plan dependent
Tax-Qualified Pension Plans (TQPPs) *** in abolition	1,200	2011	N/A	N/A	2%	No min required	No min required	Plan dependent
National Pension Funds (NPFs)	550	2011	420	2011	1%	None	Plan dependent	Max JPY 68,000 per month including contribution to NPI
Korea								
Corporate DB Plans	3,300	2011	N/A	N/A	14%	Plan dependent	Allowed	Max KRW 18 million per year
Hong Kong								
Occupational Retirement Schemes Ordinance (ORSO) DB Schemes	140	2011	N/A	N/A	4%	Plan dependent	Plan dependent	Plan dependent

Source: see figure 12

A fixed discount rate has been common in the past, but market-based valuation methods (e.g. using bond yields) are now more frequently used, as the IFRS is adopted throughout the region.

Korean DB funds are expected to use corporate bond yields as discount rates, while marking assets to market under the IFRS (Towers Watson, 2005), but Moon (2008) documents numerous inadequate actuarial practices in the region.

Japanese DB funds are expected to value assets based on economic or fair market value, but they can smooth the valuation rate (Usuki, M, 2007). Japan's PFA data presented at the IMF OAP/FAD Conference in 2013 indicates that EPFs use higher discount rates than most DBCPs, which use a rate between 2 and 4%.

While the use of a market rate is arguably preferable to using a constant rate – whether it includes a credit spread component or not – the use of the same market rate to discount all pension liabilities regardless of the sponsor credit rating, pension funding situations and asset allocation policy can hardly be justified. Indeed, it is impossible to imagine that the sponsor's health has no influence on the future value of pensions, or even on their existence.

4.3.2 Long-term objectives?

East Asia's corporate DB plans thus exhibit typical issues found in similar plans elsewhere, in particular a tendency to ignore and even to minimise their liabilities. But unlike US plans for example, Japanese, Korean or Hong Kong corporate DB plans have limited long-term objectives since their liability seldom extends beyond the date of departure or retirement of individual employees.

Since, they typically do not provide a pension i.e. an annuitised income stream, longevity risk is irrelevant for sponsors and the extent to which indexation impacts liabilities is more limited than in the case of indexed annuities.

Moreover, because these plans are voluntary for the firm and effectively financed by

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Table 14: Corporate DB schemes parameters (continued)

Scheme	Ret. Age	Taxation	Benefit Composition	Premature Withdrawal	Vesting or Accrual Rules	Full Benefit Eligibility	Minimum Benefit Eligibility	Indexation and Guarantees
Japan								
Employees Pension Funds (EPFs)	60	- Tax-deductible contributions - Benefits and investment income taxed at withdrawal - Deduction for annuities - Special rate for lump sums tied to seniority	- Basic substitutional benefit plus additional benefit - Basic benefit and at least half of the additional benefit should be paid as a life annuity - Lump sum possible for supplementary benefit with 3 years of contributions, with financial penalty - Annuity possible for supplementary benefit with 20 years of contributions	No	Plan dependent, but benefit reduction possible	- 1 month contributions for basic benefit - Plan dependent for the additional benefit but cannot exceed 20 years of contributions	Plan dependent	Guaranteed substitutional benefit
Defined-Benefit Corporate Pensions (DBCPs)	60	- Tax-deductible contributions - Partial tax deduction at withdrawal of benefits depending on their type - Special corporate tax may apply to assets	- Plan dependent - Annuity benefit - Lump sum possible with financial penalty but only with at least 3 years of contributions - Hybridity possible via cash balance plans	No	Plan dependent, but benefit reduction possible	Plan dependent but cannot exceed 20 years of contributions	Plan dependent	In a hybrid setting, a positive interest rate based on the government rate is guaranteed
Tax-Qualified Pension Plans (TQPPs) *** in abolition	Plan dependent	- Tax-deductible employer contributions until 2012 - Special asset tax may apply	Annuity benefit only	No	No clear rules	No clear rules	No clear rules	None
National Pension Funds (NPFs)	65	Tax-exempt individual contributions up to the contribution limit	- Hybridity present - Benefits purchased and received as annuity lots	No	Immediate vesting implied	None	None	N/A
Korea								
Corporate DB Plans	55	- Preferential taxation up to KRW 12 million - Preferential taxation for annuity benefits	- Annuity benefit for 5 years - Lump sum possible, especially when changing jobs - Should not be less than one month's average salary per year of service - Hybridity possible in combination with DC plan	No	Accrual of one monthly salary based on average final wage per year of service	10 years of contributions	None	Wage indexation
Hong Kong								
Occupational Retirement Schemes Ordinance (ORSO) DB Schemes	Plan dependent	Tax-free contributions and benefits	- Lump sum - Hybridity possible in combination with DC plan	Upon redundancy	- Plan dependent - Gradual vesting after 3 years	Plan dependent	Plan dependent	Plan dependent

Source: see table 12

4. Improving Defined-Benefit Plans

employers, they amount to a form of deferred compensation, in the context of the retirement allowance tradition discussed above.

The nature of the benefit can lead to a focus on capital preservation and to investing in low-yielding guaranteed products, as is the case in Korea for example (see section 4.5 below).

In Japan, firms suffer from a generalised debt-overhang problem (Koo, 2003), which their pension liabilities, even calculated as lump sums, only make more acute. The tendency is thus to take more risk, as their choice of discount rates also implies, potentially at the expense of plan members. Long-term objectives are thus sacrificed to try and satisfy short term constraints.

Next, we review the short-term constraints under which they should be expected to do so.

4.4 Short-term constraints

For corporate DB plans as for other pension funds, achieving the long-term objective of funding pension obligations should to be done within the limits imposed by a set of short-term constraints, which are part statutory, part self-imposed.

4.4.1 Funding Rules

Once the issue of evaluating the liabilities has been dealt with, the question is whether they should be fully covered by setting aside reserves immediately.

The funding ratio is the value of the pension scheme's assets over its accrued-to-date liabilities. The value can be quite different depending on the aforementioned assumptions, notably the discount rate and the choice of ABO or PBO.

DB funding ratios can vary substantially with the actuarial and accrual methods used. Pugh (2006) describes funding regulations and the issues they raise. In terms of valuation, there is a debate about whether regulators should impose actuarial assumptions or even the valuation rules. This would limit the potential for manipulation from the sponsor, but might be too much of a brute force approach. Sponsor-specific factors, such as the size and duration of the liabilities, the health of the sponsor, and the investment strategy on the asset size, can usefully be taken into account when assessing liabilities.

In terms of prudential rules, the main questions revolve around what to do in case of underfunding (Pugh, 2006). Demanding full funding at all times may drive the sponsor company into bankruptcy, especially under market valuation rules. The volatility in the funding ratio would be unmanageable, even when the valuation frequency is lower than one year. On the other hand, being too lenient may simply postpone the problem until it is too late to fix.

Minimum funding rules for pension schemes may be very costly to apply directly and fail to recognise the specificities of pensions (see for instance Amenc

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et al., 2012). First of all, it is not clear at all that DB pension plans need to be fully funded as long as the sponsor is capable of paying benefits every year. Second, pension plans are truly long-term investors and the underfunding at a given point in time could be meaningless as long as the adequate asset-liability management strategies are being applied.

Funding requirements for East Asia's DB plans, even though they are statutory, offer some degree of flexibility and may partly explain explain the preference of employers for DB schemes compared to DC schemes, which have stricter funding obligations.

For example in Hong Kong's ORSO DB schemes, the combined vested liability should be fully covered, but actions upon shortfall are negotiable. Still, Hong Kong is the only country in the region where non-compliance can lead to judicial proceedings (Mandatory Provident Fund Schemes Authority, 2012b).

Similarly, Japan's EPFs and DBCPs should be 100% funded (Usuki, M, 2007) under a flexible timeframe. Enforcement, however, is lax.

New regulations for Korean DB plans require 90% funding (compared to 60% in the past) and prescribe an employer contribution to fill the gap (Ju, 2011).

There is a debate between advocates of tighter regulation designed to provide explicit incentives for pension funds to increase their focus on risk management and those arguing that imposing short-term funding constraints and solvency requirements on such long-term investors would only increase the cost of pension financing.

It has been widely documented that the cost of capital increases with mandatory pension contributions. Campbell et al. (2012) show that this is due to generally tighter financial constraints for the firm. However, the impact is found to be only statistically and economically significant for firms that are already non-investment grade. Prudential rules that apply indifferently without considering the health of the sponsor may thus do more harm than good.

Still, Martellini and Milhau (2009) show that it is not so much the presence of short-term funding ratio constraints that is costly for pension funds as their reluctance to implement risk-management strategies that are optimal given such regulatory constraints.

4.4.2 Investment restrictions

Generally speaking, the type of restrictions discussed in section 3.4.2 on East Asia's pension reserves also apply to corporate DB plans. Other notable constraints include:

- Korean DB plans have maximum limits as follows (Nomura, 2010):
  - Listed domestic and international stocks may not exceed 30%,
  - Equity funds must be under 50%,
  - Balanced funds must be 50% or less,
  - International bond funds may not exceed 50%

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- Hong Kong's ORSO schemes cannot invest in unlisted equity (Mandatory Provident Fund Schemes Authority, 2012c).

In addition, the prevalence of lump sums and frequent premature withdrawals require holding higher levels of cash than may otherwise be necessary, which acts as a *de facto* constraint.

4.5 Investment management

4.5.1 Funding levels

Funding levels vary dramatically across the region.

In Japan, according to the Ministry of Health (MHLW), half of all Japanese EPFs are underfunded, and their total shortfall in 2012 was over JPY 2 trillion (USD 20 billion). In particular, efforts to increase returns have been unsuccessful, as figure 38 illustrates. EPFs take on substantially more risk without improving returns compared to public DB schemes (Reserve funds).

Current funding levels of Korean corporate DB plans vary between 70% and 80% (Top1000Funds, 2012), which, considering the historic minimum requirement of 60%, is a sign that DB funds in Korea could probably achieve full funding if they aimed to improve risk-adjusted performance.

In 2011, Korean principal-guaranteed DB products earned 4.64% on average, with actual returns ranging from 4.21% to 5.22%. Non-guaranteed DB products, on the other hand, earned −0.67% on average in the same year, with returns ranging from −7.84% to 3.74% (Towers Watson, 2012b). Wage inflation in the same period was 5.5%, highlighting the need for better performance (Top1000Funds, 2012). A stronger focus on return generation will help corporate pension plans improve their funding without increasing the cost burden on employers.

In contrast, only six out of Hong Kong's 254 DB ORSO schemes were underfunded as of 2012. Mandatory Provident Fund Schemes Authority (2012a) reports that these shortfalls at ORSO schemes were caused by investment underperformance.

The frequent failure to reach adequate levels of funding results from inadequate ALM practices. In DB plans, the methods for asset-liability management cannot be applied without recognising the role played by the sponsor (see for instance Martellini and Milhau, 2010). Indeed, the sponsor acts as a guarantee if the assets are insufficient to cover the payment of the benefits. The asset-liability management strategy, if it ignores the sponsor, might create procyclical effects. If funding needs to increase just as the sponsor's health is deteriorating (as can happen during a downturn in the business cycle), then the retirement scheme might endanger the solvency of the sponsor company.

Still, there is little evidence of scientific ALM implementation in East Asia DB plans. When it exists, ALM is undertaken on the side of the investment solution providers, i.e. banks and insurance companies to which asset management gets outsourced.

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In the absence of a structuring role of the scheme's liabilities in setting investment objectives, the incentives to invest on a liability-driven basis do not exist. The long-term target becomes a loosely defined asset preservation strategy with an option to require *ad hoc* sponsor contributions in due course, and within a limited timeframe, since benefits are paid as lump sums.

4.5.2 Asset allocation

In the absence of proper asset-liability management, there is clear evidence of conflicts of interests between the various stakeholders and, in particular, between shareholders and pensioners.

The tendency of many DB corporate pension funds to invest on a large scale in risky assets is not beneficial for pensioners and is the result of a veritable conflict of interest between the corporation's shareholders and its future pensioners. Assuming they do not have access to any surplus of the pension fund, this increase in risk-taking is detrimental from the pensioners' perspective because it involves increasing the likelihood of partial recovery of pension claims, while risk-taking allows shareholders to reduce the burden on contributions needed to meet expected pension payments due to exposure to the upside potential of performance-seeking assets.

This description fits the pattern of Japanese DB plans, which have high allocations to equities - often put to 50% (IPAsia, 2009). Figure 38 suggests, however, poor risk adjusted performance.

Conversely, other East Asian corporate DB plans are invested in low-yielding assets. For example, in 2011, Korean corporate pension plans were still heavily invested in guaranteed insurance contracts, offering a guaranteed interest rate (GICs), and term savings: 93% of all assets and growing (58% of this amount was invested in cash) (Top1000Funds, 2012).

As mentioned above, lump sums and premature withdrawals hinder investment return maximisation and complicate liability modelling, since they require high levels of cash than may otherwise be necessary.

Moreover, contrary to Japan, funding levels have so far been less problematic in Korea because funding constraints were low (60%) and the sector is still at an early period of its development and asset growth is high. Hence, sponsors have completely disregarded performance seeking objectives and focus on capital preservation.

Since 2012 however, a gradual shift towards more balanced portfolios has emerged as the minimum funding ratio was increased to 90%

4.6 Potential improvements

The investment problem faced by DB funds in East Asia is rather simpler than for most DB schemes in the rest of the world: since they mostly pay a lump sum on retirement or when individuals decide to withdraw their vested benefits; these plans are not exposed to longevity risk at all and are

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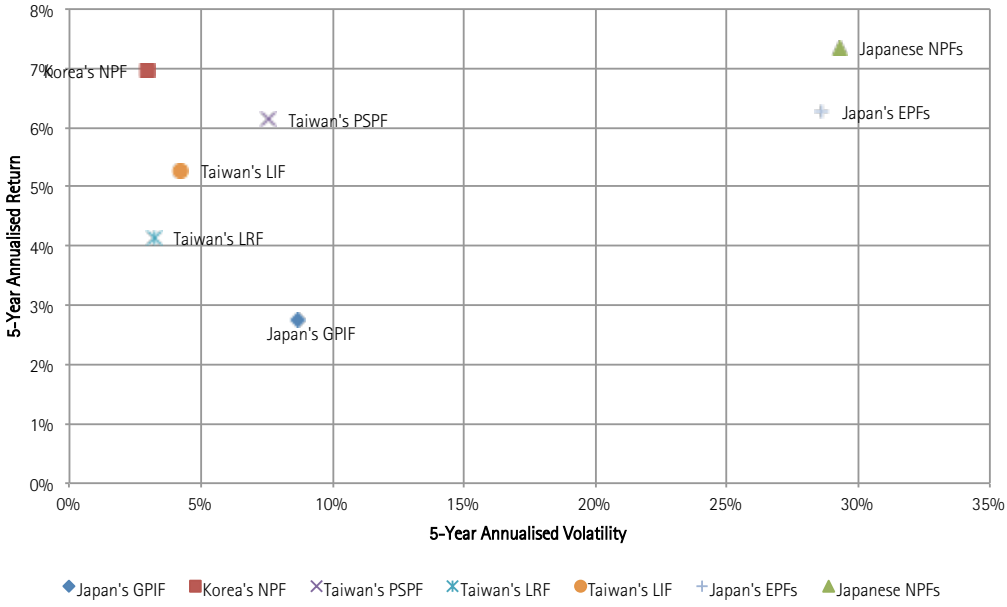
Figure 38: Return and volatility of Japanese DB schemes compared to reserve funds, 5-year annualised, 2003-2007



Source: Annual reports and author's calculations

only exposed to indexation risks until the retirement date.

These risks, which are typically transferred to individuals when moving from DB to DC schemes, have always been carried by individuals in the case of East Asia, insofar as their complementary, private retirement income is concerned.

What East Asia's corporate DB schemes now need to achieve is an improvement of their funding level and volatility, in the context of more stringent regulation and the need to minimise demands on the sponsor.

Corporate DB plans should aim to optimise the funding of their liabilities, as higher contributions may not be economically feasible and shortfall risk is borne by plan sponsors. In particular, a liability-hedging portfolio helps meet guarantees and allows for capital preservation, while freeing up a risk budget to improve profitability and thereby reduce the cost burden on the employer.

4.6.1 Best practice governance

Most of the discussion relating to good governance applies similarly to occupational DB funds as it does to other forms of funds. Improper segregation of assets can lead to disasters, which can be compounded if the sponsor suffers from a turn in the business cycle at the same time.

Issues in investment governance were highlighted in the recent accounting scandal in Japan. A Bloomberg (2012) survey showed that 90% of EPF managers did not have enough experience in asset management. Kage (2011) also refers to governance as a challenge in Japanese corporate funds. Indeed, the closure of EPFs

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and TQPPs is largely attributed to lack of proper governance.

Governance is crucial to the risk-taking ability of corporate DB funds, as we discussed in section 3.6.1 in the case of pension reserve funds. Regarding corporate DB funds OECD (2007) insists on the implementation of risk-based internal controls, risk management and performance measurement for internal staff and external providers.

4.6.2 Mitigating conflicts of interest

The asset management of occupational DB funds is a complex topic. The various stakeholders, namely sponsor companies (or rather their shareholders and debt holders), current workers, and current pensioners having divergent objectives.

In this light, asset-liability management practices should aim to reconcile the incentives of the different parties. Rauh (2008) show how important it is to avoid costly financial distress. Firms that are healthier can afford to take on more risky asset allocation. However, he does not find that the pension schemes dynamically adjust their investment to take into account the sponsor's funding constraints. Phan and Hegde (2013) finds that firms with good governance tend to take more risks in their asset allocation and obtain better funding ratios.

A simple application of asset-liability management models would not be optimal for an occupational DB fund backed by a sponsor. An ALM model specific to DB funds is developed by Siegmann (2007), accounting for inflation uncertainty and its correlation with stock returns, which may be important when benefits are indexed.

Martellini et al. (2012) develop an integrated ALM model that explicitly accounts for the implicit guarantee provided by the sponsor, recognising that it is more or less risky depending on the health of the sponsor. This `sponsor risk' cannot always be fully hedged.

A major take-away is that smarter surplus sharing rules should be encouraged. In particular, giving plan members access to part of the surplus will encourage more risk-taking, which is typically in the interest of the sponsor. These sharing rules should be contingent on sponsor risk to avoid procyclicality, which may trigger a bankruptcy or the distress of the sponsor.

Additionally, imposing a cap on the terminal funding ratio can allow the purchase of downside insurance and improve the safety of the investment strategy for plan members.

4.6.3 Surplus sharing

Conflicts of interests between shareholders and pensioners could be mitigated by granting pensioners partial access to the surplus (see conditional indexation rules in the Netherlands), thereby allowing plan members to benefit from the improvement in expected performance related to more aggressive investment strategies.

A more optimal design of pension plans would rely on more subtle surplus-sharing

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rules, which could include, for example, the use of hybrid retirement plans, and/or the use of contribution holidays for DB plans, which would allow equity holders to reduce the burden of contributions while protecting the interests of pensioners.

Surplus sharing rules establish what happens in case of over-funding: does it go towards improving the benefits paid to pensioners (and if so, which generation?), or does it revert back to the sponsor company?

Rules that are too rigid and do not take into account the underlying state of both the sponsor and the pension plan (beyond funding) are suboptimal (Martellini et al., 2012). They could end up reverting cash to a healthy and well-financed sponsor while lucrative investment opportunities in the plan are forgone, or conversely they could be turned into higher benefits to pensioners at a time when the sponsor is in need of funding to weather a difficult moment.

An effective way to align the incentives of shareholders and pensioners without any complex adjustment to the pension plan structure consists of enlarging the set of admissible investment strategies so as to include dynamic risk-controlled strategies such as constant-proportion portfolio insurance (CPPI) strategies, or their extension in a pension management context sometimes referred to as contingent immunisation strategies or dynamic liability-driven investment (LDI) strategies.

Furthermore, implementing risk-controlled strategies (RCI) aiming at insuring a minimum funding ratio level above 100% allows shareholders to get some (limited) access to the upside performance of risky assets, ensures that pensioners are not hurt by the induced increase in risk.(see Martellini et al., 2012)

4.6.4 Risk sharing

Since the premature withdrawal of benefits and lump sum payouts in East Asia's DB schemes do not lead to pension savings being invested in dedicated post-retirement solutions, these schemes can be characterised as crudely hybrid.

Amongst the solutions addressing the shortcomings of DB plans, transitions are possible towards more advanced hybrid pensions - which would still offer member security through a sponsor guarantee, but incorporate some degree of risk sharing between the employees and the sponsor.

For instance, conditional indexation links part of the benefits to the financial performance of the fund. Such solutions reduce the volatility of liabilities, and are therefore beneficial to the sponsor without leaving individuals completely exposed.

According to Sender (2012), moving toward hybridity would provide the flexibility and tools to ensure occupational pensions are sustainable and can be tailored to the specific needs of both sponsors and plan members. The conceptual framework would not preclude the use of proper integrated ALM techniques, but much to the contrary enable it.

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A degree of sharing of members' longevity risk would also improve the attractiveness of DB plans. Options include buy-ins [15], buy-outs [16] or longevity swaps [17] for DB pension plans. A buy-in would entail an insurance policy held by the trustee, while a buy-out would be held by the plan member. Full buy-outs are quite costly, as they entail the immediate payment of any plan shortfall. As a consequence, partial insurance is therefore much more common. Partial buyouts and longevity swaps aim to hedge only part of the liabilities and are increasingly frequent (Biffis and Blake, 2012).

Of course, mandatory annuitisation, along with the elimination of premature withdrawals, would help set the liability duration and have clearer investment objectives rather than keeping a large liquidity reserve.

Substantial progress has been achieved in reducing premature withdrawals, especially in Korea where, in the past, such withdrawals occurred with every job change,

However, it is not clear if mandatory annuitisation would improve voluntary enrolment and, subsequently, asset accumulation if the plans themselves are not made mandatory. Also, in the context of continuously low interest rates (see section 2.3, the cost of annuitisation may remain prohibitive.

4.6.5 The transition to DC

Finally, in the absence of greater risk sharing with sponsors, current DB plans can play a role in smoothing the transition to defined-contribution schemes (reviewed in section 5), which can also offer long-term investment solutions.

While DB schemes will, in all likelihood, continue to pay lump sums and not offer post retirement income, these lump sums are increasingly being channelled into defined-contribution (DC) accounts. In Korea for example, premature withdrawals must now be deposited into individual retirement accounts (IRAs) to earn basic interest (Phang, 2007; Towers Watson, 2010).

In Japan, moving a DB pension to a DC fund has been possible since 2005 via a lump sum (Takayama, 2012c). In Hong Kong's ORSO DB plans after 2000, vested benefits are protected and transferred into an MPF scheme upon job change. Indeed, a transition to DC provision in East Asia is supported by the *de facto* benefit portability allowed by lump sums.

4.7 Conclusions

In this section, we have highlighted the link between the traditional retirement allowance system, which has been prevalent in East Asia's corporate culture for decades, and the existence and characteristics of corporate or occupational defined-benefit pension funds.

Private DB plans have existed in the region since the 1960s in the case of Japan or have been introduced as late as 2005 in the case of Korea. However, even when DB plans have

15 - An insurance policy covering benefits for a selection of pensioners. The trustees continue to manage the scheme but have certainty about the plan's costs. The insurer write a policy in the name of the trustees

16 - Buy-outs involve the transfer of the scheme's asset and liabilities to a regulate insurer.
The sponsor and trustees are fully discharged of the pension liability. The insurer then write a policy in the name of individual members

17 - A contract by which one party makes regular payments based on agreed mortality assumptions to an investment bank or insurer and, in return, the bank or insurer pays out amounts based on the scheme's actual mortality rates. This mirrors the structure of an interest rate or inflation swap.

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existed for decades, they have not become a dominant part of the pension system, unlike in other jurisdictions (e.g. US).

They also generally restrain from providing any pension income to retirees, but instead pay out lump sums, because they are either the preferred choice or the only option available.

Thus, the benefits paid by private DB plans in East Asia are only `defined' or guaranteed insofar as they represent a certain multiple of past wages, according to the relevant formula available when plan members retire or leave their position. Post-retirement solutions, including the management of longevity and inflation risks, remain beyond the scope of these plans so far, with a few limited exceptions.

As a form of deferred compensation, East Asia's private DB plans have seen their assets grow initially because they are typically preferred by the large conglomerates that make up the core of East Asia industrial fabric. However, private DB asset growth typically tailed off once large employers had adopted them, unless they are made mandatory.

In East Asia, DB plans also stopped growing because new legislation was introduced to promote DC plans.

Thus, DB assets have not grown for many years in Japan, but have only been transferred from one scheme to the next, as reforms aimed at improving the governance and performance, but also the growth of the sector still continue to unfold. They remain voluntary schemes only.

In Hong Kong, where DB plans are also voluntary, membership stopped growing despite such plans remaining open to new members, because DC pensions became mainstream, offering full and immediate vesting, which is not the case with DB plans. Cumulative asset growth is now limited and mostly driven by investment performance. In 2011, DB assets had returned to their 2007 level.

In Korea, where corporate plans have only become mandatory since 2011, DB asset are still growing rather fast, but such plans have only been introduced in 2005, and it remains to be seen whether this trend can continue once large corporations have adopted them. In 2012, 16.5% of permanent employees in Korea worked for a large firm (of more than 300 employees), excluding the public sector. Indeed, while private pensions are now mandatory, employers have a choice between DB and DC plans.

Our review of corporate and occupational DB plans in East Asia yields a number of salient points, which we summarise below.

Size and significance

- Corporate and occupational DB plans only exist in Japan, Hong Kong and Korea, where their cumulative assets represented 16%, 6% and 2% of GDP, respectively, in 2011
- These plans have mostly remained voluntary and have thus failed to grow

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on a scale commensurate with other supplementary pension systems in the rest of the world. Only Korea has introduced mandatory corporate pensions in 2011 but with a choice between DB and DC schemes.

- While they represent an asset pool of limited size, private DB funds remain the second largest pension asset pool in East Asia, after reserve funds, which are much larger.
- With the exception of Korea, which introduced DB plans recently, asset growth has tended to tail off once a certain level of coverage had been achieved.

Funding and benefits

- In Japan (70%) and Korea (100%), DB plans are of a contractual nature i.e. they do not exist as an independent fund but are effectively investment mandates given to asset managers. Actual corporate pension funds exist in Hong Kong and to a lesser extent in Japan. Contactual plans also exist in Hong Kong.
- Funding is mostly provided by employers and the combination of a mandatory minimum accrual with the absence of a minimum contribution can lead to unfunded liabilities.
- Vesting rules in East Asia are often unclear and not statutory, although full vesting in Japanese and Korean DB plans after three years is common practice. Recent reforms in Hong Kong have improved benefit rights vesting.
- Private DB plans do not necessarily provide a pension i.e. an annuitised income stream. Instead, most such schemes pay a lump sum. In Japan, annuities are available for individuals with more than 20 years of contributions but they are not preferred. In Korea, annuities have fixed term of five years, and they are not available elsewhere in DB plans in the region.
- Thus, longevity risk is mostly irrelevant for sponsors, and the extent to which indexation impacts liabilities is more limited than in the case of life-long indexed pensions common in other DB schemes globally.

Objectives and constraints

- Since private DB plans typically pay out lump sums at the date of retirement or departure of employees, they have very loosely defined long-term investment objectives, typically focused on capital preservation.
- The necessity to pay a lump sum when an employee leaves a position also forces such plans to hold larger amounts of cash or very liquid and low-risk securities, to the detriment of yields.
- Investment restrictions minimise exposure to listed equities (e.g. Korea) or ban unlisted investments (e.g. Hong Kong).
- In Japan, DB plans have higher allocations to equities (above 50%), otherwise private DB plans in the rest of East Asia are invested in low-yielding assets. Korean DB plans hold more than 90% of their assets in low-yielding liquid instruments, including more than 50% in cash.
- In effect, the focus on paying lump sums leads to a virtual abandonment of the

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investment management question that should be addressed in the context of corporate DB funds and creates potentially substantial opportunity costs for sponsors. There is seldom evidence of ALM and funding and accrual rules creating enough flexibility to minimise employer contributions in the short-term.

- Required funding levels are typically 100% in Japan and Hong Kong and 90% in Korea, but monitoring and implementation are understood to be limited and sponsor action negotiable. As a result, underfunding is widespread but varies considerably from occasional in Hong Kong DB plans to quasi-systematic in Korea or Japan.

Improvements for plan sponsors

- The problem faced by DB funds in East Asia is rather simpler than for most DB schemes in the rest of the world since they are mostly not exposed to longevity risk, and only exposed to indexation risks until the retirement or departure date of employees.
- East Asia's corporate DB plans need to improve their funding level and volatility in the context of more stringent regulation. They also need to minimise demands on the sponsor, since higher contributions may not be economically feasible and shortfall risk is borne by plan sponsors. Indeed, short-term funding ratio constraints would not be costly for pension funds if they implemented risk-management strategies that are optimal given such constraints.
- A liability-hedging portfolio helps meet guarantees and allows for capital preservation, while freeing up a risk budget to improve profitability and thereby reduce the cost burden on the employer. However, a simple application of asset-liability management models would not be optimal for an occupational DB fund backed by a sponsor. Martellini et al. (2012) develop an integrated asset-liability management (ALM) model that explicitly accounts for this implicit guarantee, recognising that it is more or less risky depending on the health of the sponsor.
- Moreover, smarter surplus sharing rules should be encouraged. In particular, giving plan members access to part of the surplus will encourage more risk-taking, which is typically in the interest of the sponsor, while imposing a cap on the terminal funding ratio can allow the purchase of downside insurance and improve the safety of the investment strategy.

Improvements for plan members

- The absence of post-retirement income provision in the majority of East Asia's private DB plans leaves the issue of longevity risk and achieving a given level of post-retirement income entirely to individuals.
- A greater level of risk sharing with sponsors during the post-retirement phase would obviously be beneficial to plan members. However, given the history of such plans in the region, such increased risk sharing seems unlikely

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unless some form of annuitisation is made mandatory by the regulator.

- Still, options exist to improve risk sharing. These include buy-ins [18], buy-outs [19] or longevity swaps [20] for DB pension plans. A buy-in would entail an insurance policy held by the trustee, while a buy-out would be held by the plan member. Full buy-outs are quite costly as they entail the immediate payment of any plan shortfall. As a consequence, partial insurance is much more common.

Hence, the private DB sector in East Asia remains rather underdeveloped despite having the longest history of all the corporate and occupational plans available in the region. Assets have grown initially but this growth has typically tailed off after a while and total assets never came to represent a large share of GDP.

Mostly voluntary schemes are funded solely by employers and mostly set up as contractual plans with external managers. They have not led to the creation of a strong corporate pension sector, but instead have become an avatar of the retirement allowance preference that has historically defined East Asian corporate culture.

The role of pensions as a source of deferred pay to reward loyal employees and provide long-term incentives to managers has long been recognised in practice and in the academic literature (Blake, 2006). Corporate pensions in East Asia essentially continue to play this role, but not that of providing retirement income to members.

In the absence of improved risk sharing between plan sponsors and member during the post-retirement phase, individuals who receive lump sum benefits must manage their own retirement savings to finance the share of their lifecycle deficit that is not covered by public pensions.

In this context, DB lump sums can be used to access DC solutions when individuals change position or retire, which we discuss next.

18 - An insurance policy covering benefits for a selection of pensioners. The trustees continue to manage the scheme but have certainty about the plan's costs. The insurer write a policy in the name of the trustees

19 - Buy-outs involve the transfer of the scheme's asset and liabilities to a regulate insurer. The sponsor and trustees are fully discharged of the pension liability. The insurer then write a policy in the name of individual members

20 - A contract by which one party makes regular payments based on agreed mortality assumptions to an investment bank or insurer and, in return, the bank or insurer pays out amounts based on the scheme's actual mortality rates. This mirrors the structure of an interest rate or inflation swap.

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This section discusses East Asia's defined-contribution (DC) plans. DC plans have so far failed to become a credible alternative to defined-benefit schemes, but we argue that they are a necessary element for the sustainability of pension systems.

We review the reasons why the shift towards DC observed elsewhere has been ambiguous at best in East Asia and what improvements are needed to attract substantial retirement savings towards DC plans that provide viable long-term solutions to future pensioners in East Asia.

Defined-contribution funds are a seemingly simple form of retirement fund: assets are contributed into the fund and then invested until the retirement of the plan member, at which time their accrued value is transferred to the pensioner, typically either as a lump sum payment or an annuity. DC plans can be dependent on an employer's contributions, the pensioner's, or a mix of both. In any case, all of the investment risk in pure DC schemes is borne by the plan member, and none by the employer. Risk sharing and guarantees for the plan member exist, however, in hybrid schemes.

In East Asia, incentives to choose DC pension plans over other individual savings products are limited. So far, employers have been making the majority of contributions to existing DC plans, often in the absence of specific tax breaks, matched contributions or behavioural incentives. Partly as a consequence, assets under management remain minimal, even when controlling for the low coverage.

Where they are voluntary, these DC schemes are perceived more like deferred compensation mechanisms or end-of-career bonuses, and are therefore not offered to all employees (e.g. Takayama, 2012c).

Where they are mandatory, accumulation is substantially higher and asset growth more sustained, but DB plans are not necessarily disappearing. The transition to DC provision in East Asia remains ambiguous.

In terms of outcomes, private DC pension arrangements in East Asia typically pay lump sums and some propose optional annuitisation. There are no regulated default options yet in the different jurisdictions and the possibility and quality of choice of investment solutions varies considerably.

Individuals have very little access to the investment solutions needed to generate adequate retirement income within a DC scheme. Hence, two types of outcomes can be observed: high allocations to risk (e.g. Hong Kong) or almost complete avoidance of risk (e.g. Korea and Japan).

In what follows, we first review in section 5.1 the landscape of DC schemes in the region. We then focus on the key issues of those plans and how they could be remedied. In section 5.2 we discuss how the regulatory framework and incentives impacts the appeal of DC funds. Then, section 5.3 discusses investment strategies for DC plan members, notably the use of lifecycle and ALM solutions, as well as packaging and post-retirement solutions in the context

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of East Asia. Section 5.4 summarises and concludes.

5.1 The need for DC Funds in East Asia

As long-term shifts, notably demographic, make pure DB schemes untenable, it is indispensable that DC fund investments are immediately ramped up. East Asia, in this respect, is in need of a rapid catch-up. This section examines the current landscape of DC funds in the region.

5.1.1 The current landscape

DC funds in East Asia are supplementary pension schemes, except in Hong Kong where they constitute the main system.

Accumulation varies considerably depending on the mandatory or voluntary nature of plans. Table 15, which summarises key facts for existing DC schemes shows that most DC plans are voluntary and have only been created about a decade ago

Figure 39 shows the size of DC assets relative to GDP and confirms that they remain small.

Table 16 and figure 40 illustrate the different types of DC plans available in East Asia. DC plans exist under public and private systems, are mostly funded (as opposed to notional DC plans which are not funded and pay a given rate of return) and contractual (i.e. there is no legally independent fund and management is completely delegated) in their majority.

Mandatory DC provision exists in Taiwan in the form of the LPF and in Hong Kong in the form of the MPFs. Taiwan's LPF and Hong Kong's MPFs both enjoy a relatively higher level of enrolment and of accumulation compared to the rest of the region.

DC arrangements in Japan and China are voluntary and primarily corporate-based, have numerous members but few assets and slow growth.

Korea has made corporate pensions mandatory in 2011, but employers still have the choice of DB or DC schemes and so far DC schemes have tended to be the second choice. Voluntary individual retirement accounts (IRAs) have also existed since 2005 and individual retirement pensions (IRPs) since 2011.

These schemes have varying degrees of hybridity, which we discuss next.

5.1.2 The shift to DC schemes in East Asia

While most countries worldwide still rely primarily on defined-benefit, there is a trend towards DC and hybrid plans being increasingly used as the main form of retirement saving, and away from the historically popular DB plans. This trend is actually nothing new; almost 25 years ago, Gustman and Steinmeier (1989) were already talking of a "stampede towards defined-contribution pension plans", already in part due to the changing regulatory environment for defined-benefit.

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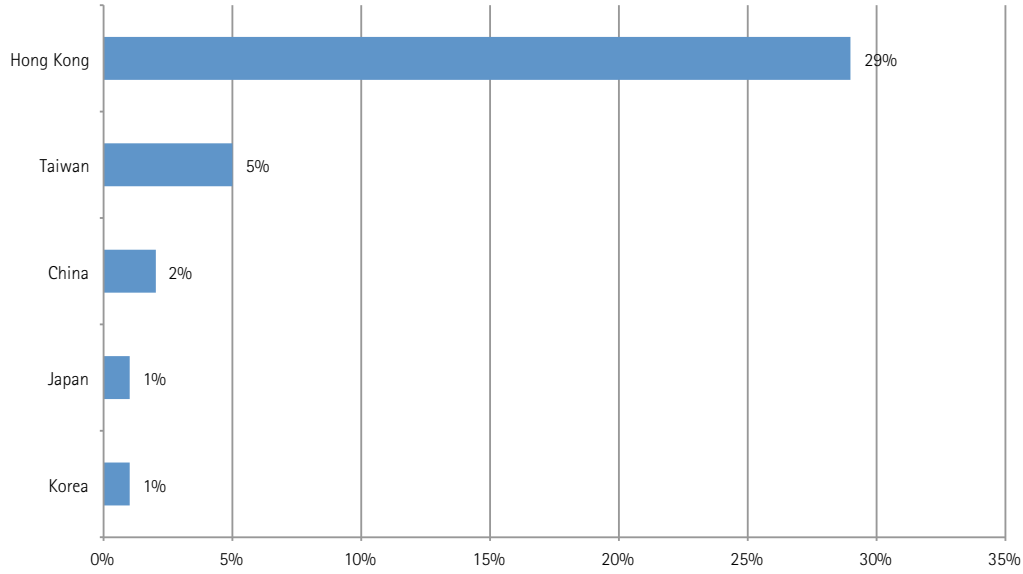
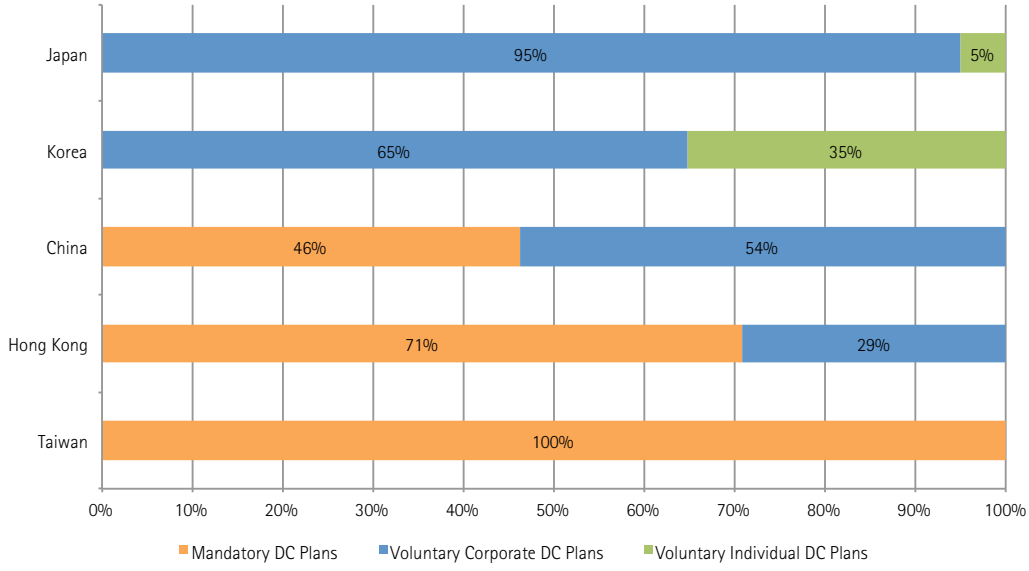
Figure 39: DC assets as a percentage of GDP in East Asia, 2011



Source: Annual reports
Note: Figures include individual and corporate DC plans

Figure 40: Proportion of DC assets invested by plan type, 2011



Source: Annual reports

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Table 15: DC schemes in East Asia

Scheme	Created	Brief Description	Management	Mandatory	Eligibility
Japan					
Corporate DC					
Corporate DC Schemes	2001	- Fully funded corporate DC pension plans - Set up as contracts with financial service providers	Private	No	Private-sector employees
Individual DC					
Individual DC Schemes	2001	- Fully funded individual DC pension plans offered by employers - Set up as contracts with financial service providers	Private	No	Private-sector employees
Korea					
Corporate DC					
Corporate DC Plans	2005	- Fully funded corporate DC pension plans - Set up as contracts with financial service providers	Private	Yes	Employees at workplaces with at least 5 staff
Individual DC					
Individual Retirement Accounts (IRAs)	2005	- Fully funded DC pension plans available to retirees in the post-retirement stage, or employees in the accumulation stage - Set up as contracts with financial service providers	Private	No	Self-employed, unemployed and retired individuals
Individual Retirement Pensions (IRPs)	2011	- Fully funded DC pension plans available to retirees in the post-retirement stage, or employees in the accumulation stage - Retirees and those changing jobs are obliged to set up an IRP and move their assets from corporate plans - Set up as contracts with financial service providers	Private	Yes	Self-employed, unemployed and retired individuals
China					
Corporate DC					
Enterprise Annuities (EAs)	2004	Fully funded corporate DC plans set up as contracts with financial service providers	Private	No	Urban workers
Taiwan					
Public DC					
Private Teachers Pension Fund (PTPF)	2010	Individual retirement savings accounts for private school teachers	Private	Yes	Private school teachers
Labour Pension Fund (LPF)	2005	- Fully funded supplementary DC plans for private sector - Managed collectively by the Bureau of Labour Insurance (BLI)	Public	Yes	Employed workers except private teachers
Hong Kong					
Occupational DC					
Mandatory Provident Fund (MPF) Schemes	2000	- Fully funded occupational DC plans set up as contracts with financial service providers - Supervised by the Mandatory Provident Fund Schemes Authority (MPFA)	Private	Yes	Full-time employees and self-employed aged 18-65
Corporate DC					
Occupational Retirement Schemes Ordinance (ORSO) DC Schemes	1993	- Fully funded corporate DC plans set up as contracts with financial service providers - Some are supervised by the Mandatory Provident Fund Schemes Authority (MPFA)	Private	No	Plan dependent

Source: see table 19

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Table 16: DC plan types in East Asia

Country	Plan	Mandatory	Corporate	Individual	Hybrid	Funded	Public	Contractual
Japan	Corporate DC Plans	○	●	○	○	●	○	●
Japan	Individual DC Plans	○	●	●	○	●	○	●
Japan	Cash-Balance Plans (CBPs)	○	●	○	●	●	○	●
Korea	Corporate DC Plans[1]	●	●	○	○	●	○	●
Korea	IRAs & IRPs	○	●	●	○	●	○	●
Taiwan	LPF	●	●	○	●	●	●	○
China	USI Individual Accounts[2]	●	○	●	○	○	●	○
China	RSI Individual Accounts[2]	○	○	●	○	○	●	○
China	EAs	○	●	○	○	●	○	●
Hong Kong	MPFs	●	●	○	○	●	○	●
Hong Kong	ORSO DC Plans	○	●	○	○	●	○	●

1 - Corporate pension plans are mandatory in Korea for newly formed companies, but employers still have a choice between DB and DC plans.

2 - Chinese individual accounts were designed to be fully funded financial DC arrangements, but their present status does not reflect that.

Signs of a shift to DC provision in East Asia exist but are still ambiguous. DC pension schemes appeared in the region in the late 1990s and early 2000s, but have been held back by the prioritisation of public pension reforms, tax inefficiencies, contribution limits, a general lack of trust, and preferences for lump sums with a DB guarantee.

Nevertheless, starting from a low base, membership and asset growth has been significant, as figures 41 and 42 illustrate.

In Taiwan, all new and job-switching members will join the LPF and not its predecessor, the LRF. Hence DC assets can be expected to grow considerably in the next couple of decades.

Asset and membership growth in Japan is more artificial. It results from the closing of a number of corporate DB schemes (e.g. TQPPs), the assets and members of which are being poured in part into the new DC framework. This kind of growth tails off rapidly. Urata (2009), for example, points to a decrease in Japanese corporate plan coverage.

Chinese entreprise annuities (EAs), albeit voluntary, have accumulated assets quite rapidly since 2007 - only three years after reforms institutionalised the system (see Zheng, 2011). Still, it is not given that asset growth will be sustained once the large multinationals and state-owned entreprises that choose to have EA plans are all covered.

Hong Kong's MPFs already covers a substantial proportion of employees. In this case, growth in assets is contingent upon higher mandatory or voluntary contributions. Hence, membership and asset growth has been slow in recent years and negative in the case of ORSO DC plans which have less attractive vesting rules than individual MPF accounts.

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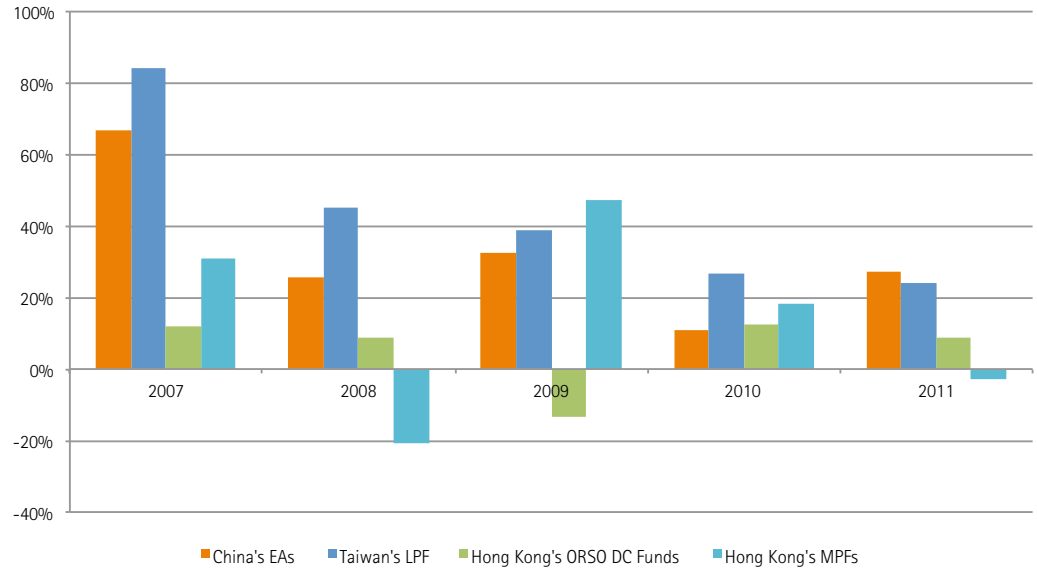
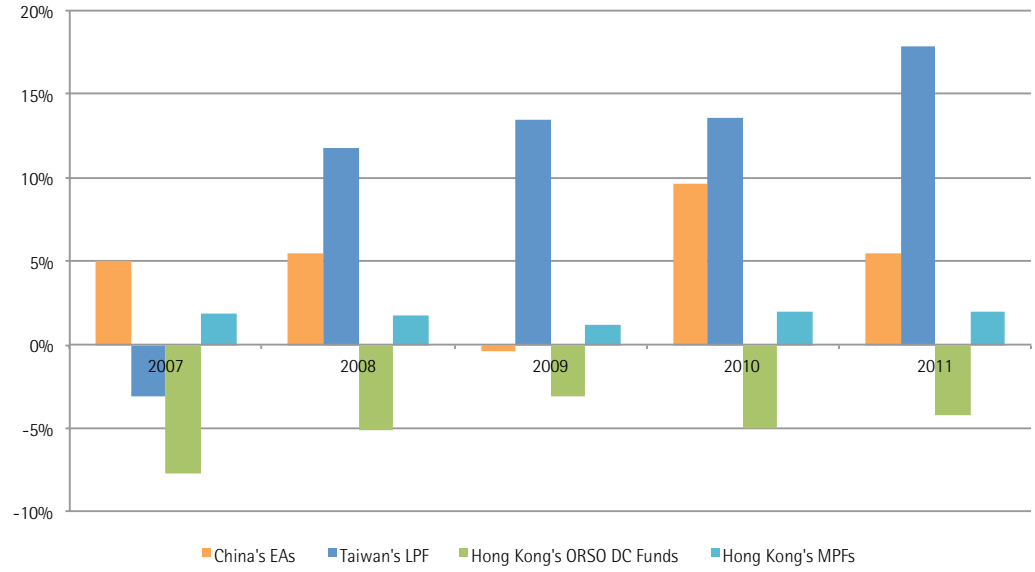
Figure 41: East Asia's DC asset growth, 2007-2011



Source: Urata (2009); Ministry of Health, Labour & Welfare (2009); Zheng (2011); Leckie and Xiao (2012), annual reports

Figure 42: East Asia's DC membership growth, 2007-2011



Source: see figure 41

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In Korea, DC growth remains limited. Potential obstacles to growth include the preference for other savings vehicles such as bank deposits, and crowding-out by DB arrangements which offer a guarantee and tend to be preferred by firms as discussed in section 4.

5.1.3 Risk-sharing and hybridity

Used as the main source of pension financing, pure DC plans can prove extremely risky for the individual since there is no guarantee that the accrued value of the assets at retirement will be enough to provide an adequate pension. Risk-sharing between members and employers is referred to as a 'hybrid' arrangement. While hybridity is seldom found in East Asia's DC plans, it can be of several types:

- **DB underpin or notional DC (NDC)** is found for example in Japanese cash-balance plans (CBPs) [21], which allow the benefit formula to depend on accumulation of points or a notional account balance, or China's USI and RSI individual accounts, which were designed to be fully funded but have never really been since contributions were used to pay the pension obligations of the USI pools (See Holzmann et al., 2012). Still, China's USI individual accounts pay out benefits even after funds in the account have run out, i.e. they effectively protect members from longevity risk. (Oksanen, 2012). Recent reforms acknowledged this state of affairs and arranged for new contributions to the RSI individual accounts to be used to pay benefits to currently retirees (Leckie and Xiao, 2012).
- **Collective DC (CDC)** or investment risk and risk management pooling is found at the Taiwanese LPF and Japanese CBPs, which do not offer investment options to members.
- **Pseudo-hybridity** allowing employers or members to combine pure DB and DC plans as part of the same arrangement, exists in Korea, where if an employer has set up both a DB and a DC plan for their employees, employees can choose to join either or both of them and split their contributions in a pre-set proportion (Hong, 2011; Ju, 2011; Towers Watson, 2012a).

21 - Cash-balance plans (CBPs) are offered by approximately 40% of employers in Japan. A DC plan with a DB underpin, they provide an indexation guarantee based on the notional account balance (Sugita, 2006; Ueta, 2009; Takayama, 2012c).

5.2 Improving DC Funds' Framework and Governance

In order to bolster investment in DC schemes in East Asia, a number of changes to the regulatory frameworks and incentives is required. It is especially necessary to keep costs under control, while nonetheless proposing worthwhile default investment solutions.

5.2.1 Regulatory incentives during the accumulation phase

Contributions to DC schemes are still insufficient to provide a meaningful substitute to DB.

A majority of contributions to East Asia's DC plans comes from employers. For example, in Korean and Japanese corporate DC plans, the employee is allowed but not required to

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contribute. In the case of Japan, the possibility of employee contributions was created only in 2012 (Nomura, 2012).

When voluntary, the availability of DC pensions is often decided by the employer. Even access to some purely individual arrangements (such as Japanese individual DC accounts and Korean IRAs and IRPs) can depend on the employer.

To improve accumulation in DC plans, incentives ingrained in pension plan design are necessary both for voluntary and mandatory DC arrangements. Depending on who contributes to such schemes, incentives apply to employers, employees, or both.

The regulatory measures and incentives are insufficient on a number of axes:

- **Contribution rates**: high contribution rates can lead to compliance evasion, as Oksanen (2012) argues in the case of China. At the same time, a lack of minimum contribution rates gives employers too much leeway, especially because they do not bear any of the outcome risk. Contribution rates are set in law in Taiwan, Korea and Hong Kong, whereas in China, the rate set by the government is used as guidance only (Zheng, 2011). Contribution ceilings can be used to prevent tax evasion, but can be prohibitively low and limit incentives to contribute, as is the case in Japan for example.
- **Taxation arrangements**: tax deductibility of contributions is necessary to encourage compliance with mandatory contributions and additional voluntary contributions. Such provisions exist but are said to be insufficient in Japan and Taiwan. In China, tax rules are set at the province level and little clarity exists in the tax law. In fact, tax breaks on EAs are used as stimulus for companies to set up offices in certain provinces and not others. There are even numerous examples of varying levels of tax deductibility from one economic development zone to another.
- **Guarantees and indexation**: such promises offer a level of risk sharing, but they are rare and not always coordinated with investment strategy. Taiwanese LPF and Japanese cash balance plans (CBPs) offer a minimum annual return equivalent to the short-term deposit rate of interest. Elsewhere, guarantees may exist if the individual chooses a guaranteed-principal or guaranteed-interest investment option.
- **Vesting and portability rules**: these are crucial for building up trust and benefit security.Mandatory schemes such as the Taiwanese LPF and Hong Kong MPFs, as well as purely individual DC plans such as the non-employer-sponsored IRAs in Korea, offer immediate full vesting of all contributions, whereas in corporate DC arrangements, employer contributions typically vest after several years. It is worth noting that vesting rules are rarely set in law and are rather based on common usage.
- **Compliance**: binding rules for compliance exist only in Hong Kong, where the MPFs regulator - the Mandatory Provident Funds Authority (MPFA) - has made non-compliance a

Table 17: DC schemes parameters

Scheme	Participants (th)	as of	Recipents (th)	as of	% empl. pop	Employer Contribution	Employee Contribution	Contribution Limits
Japan								
Corporate DC								
Corporate DC Schemes	4,100	2011	N/A	N/A	7%	Plan dependent	Allowed	- Max JPY 25,500 per month for employees whose employer offers a DB pension - Max JPY 51,000 per month for employees for whom the DC fund is the primary employer fund - Employee contribution may not exceed employer contribution
Individual DC								
Individual DC Schemes	132	2011	N/A	N/A	0%	None	Plan dependent	- Max JPY 68,000 per month including contribution to NPI for the self-employed - Max JPY 23,000 per month for private-sector employees whose employer does not offer a pension fund - Max JPY 25,500 per month for employees whose employer offers a DB pension - Max JPY 51,000 per month for employees for whom the DC fund is the primary employer fund
Korea								
Corporate DC								
Corporate DC Plans	3,300	2011	N/A	N/A	14%	8%	Allowed	Max KRW 18 million per year
Individual DC								
Individual Retirement Accounts (IRAs)	3,300	2011	N/A	N/A	14%	Plan dependent	Plan dependent	No employee co-contribution if employer-sponsored
Individual Retirement Pensions (IRPs)	80	2011	N/A	N/A	0%	Plan dependent	Plan dependent	Employed individuals can contribute max KRW 12 million per year
China								
Corporate DC								
Enterprise Annuities (EAs)	13,400	2010	N/A	N/A	2%	Plan dependent	Not required or allowed	Max 8.33% of annual wages or 12.50% of salaries
Taiwan								
Public DC								
Private Teachers Pension Fund (PTPF)	67	2011	N/A	N/A	1%	7.80% from employer and government	4%	Contributions are calculated based on twice the basic pay
Labour Pension Fund (LPF)	5,500	2011		155 2011	51%	6%	Allowed	Employee contributions cannot exceed 6%
Hong Kong								
Occupational DC								
Mandatory Provident Fund (MPF) Schemes	2,600	2011	N/A	N/A	73%	5%	5%	Dependent on max pensionable income of HKD 25,000
Corporate DC								
Occupational Retirement Schemes Ordinance (ORSO) DC Schemes	280	2011	N/A	N/A	8%	Plan dependent	Plan dependent	Plan dependent

Source: see table 19

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Table 18: DC schemes parameters (continued)

Scheme	Ret. Age	Taxation	Benefit Composition	Premature Withdrawal	Vesting or Accrual Rules	Full Benefit Eligibility	Minimum Benefit Eligibility	Indexation and Guarantees
Japan								
Corporate DC								
Corporate DC Schemes	60	- Tax-deductible contributions - Benefits and investment income taxed at withdrawal	- Annuity benefit - Lump sum allowed for account balance below JPY 15,000 Can include disability, survivor and other benefits	No	- Employer contributions vesting is plan dependent, normally 3 years - Employee contributions are vested fully and immediately	10 years of contributions	Varies with retirement age	Guaranteed principal depending on choice of investment strategy
Individual DC								
Individual DC Schemes	60	- Tax-deductible contributions - Benefits and investment income taxed at withdrawal	- Annuity benefit - Lump sum allowed for account balance below JPY 500,000 or less than 3 years of contributions - Can include disability, survivor and other benefits	No	All contributions are vested fully and immediately	10 years of contributions	Varies with retirement age	Guaranteed principal depending on choice of investment strategy
Korea								
Corporate DC								
Corporate DC Plans	55	- Preferential taxation up to KRW 12 million - Preferential taxation for annuity benefits	- Annuity benefit for 5 years - Lump sum possible, especially when changing jobs - Should not be less than one month's averag salary per year of service - Hybridity possible in combination with DB plan	Upon long-term illness or purchase of first residence	Immediate vesting implied	10 years of contributions	None	- Wage indexation - Guaranteed principal or interest rate depending on choice of product
Individual DC								
Individual Retirement Accounts (IRAs)	55	- Tax-deductible contributions up to KRW 4 million per year across plans - Tax-exempt benefits up to KRW 6 million per year - Preferential taxation for annuity benefits	- Annuity benefit for 5 years - Lump sum possible	Upon long-term illness or purchase of first residence	Immediate vesting implied	10 years of contributions	None	Guaranteed principal or interest rate depending on choice of product
Individual Retirement Pensions (IRPs)	55	- Tax-deductible contributions up to KRW 4 million per year across plans - Tax-exempt benefits up to KRW 6 million per year - Preferential taxation for annuity benefits	- Annuity benefit for 5 years - Lump sum possible	Upon long-term illness or purchase of first residence	Immediate vesting implied	10 years of contributions	None	Guaranteed principal or interest rate depending on choice of product

Source: see table 19

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Table 19: DC schemes parameters (continued)

Scheme	Ret. Age	Taxation	Benefit Composition	Premature Withdrawal	Vesting or Accrual Rules	Full Benefit Eligibility	Minimum Benefit Eligibility	Indexation and Guarantees
China								
Corporate DC								
Enterprise Annuities (EAs)	60 for men, 55 for women	- Tax-deductible employer contributions up to 5% - Fully taxed employee contributions	- Lump sum - Annuity benefit	No	- Plan dependent - Full vesting commonly after 5 years - Full immediate vesting of employee contributions if any	Plan dependent	None	None
Taiwan								
Public DC								
Private Teachers Pension Fund (PTPF)	65	- Employee contributions deductible up to TWD 24,000 per year - Lump sum benefit deductible up to TWD 150,000 - Monthly benefits deductible up to TWD 650,000 per year	- Monthly benefit possible after 15 years of contributions - Lump sum	No	N/A	25 years of service	10 years of service	N/A
Labour Pension Fund (LPF)	60	- Employee contributions deductible up to TWD 24,000 per year - Lump sum benefit deductible up to TWD 150,000 - Monthly benefits deductible up to TWD 650,000 per year	- Monthly benefit - Lump sum possible for members enrolled before 2009 - Includes survivor benefits	No	Immediate full vesting	None	None	Guaranteed interest rate
Hong Kong								
Occupational DC								
Mandatory Provident Fund (MPF) Schemes	65	- Tax-deductible employer contributions up to HKD 15,000 per year - Tax-deductible employee contributions up to HKD 15,000 per year - Tax-exempt benefits unless premature withdrawal	Lump sum only	Upon terminal illness or permanent departure from HK	All contributions are vested fully and immediately	None	None	None
Corporate DC								
Occupational Retirement Schemes Ordinance (ORSO) DC Schemes	Plan dependent	Tax deductible contributions	- Lump sum - Hybridity possible in combination with DB plan	Upon redundancy	- Plan dependent - Gradual vesting after 3 years	Plan dependent	Plan dependent	Plan dependent

Source: Nomura (2010); Takayama (2012c,b); Ministry of Health, Labour and Welfare (2009); Urata (2009); Nomura (2012); National Institute of Population and Social Security Research (2011); Takayama (2003b,a); Ignites Asia (2013c); Ministry of Strategy & Finance (2012); Leckie and Xiao (2012); Zheng (2011); Oksanen (2012); Moo (2009); Shi and Mok (2012b); National Pension Fund (2011); Moon (2008); Seok et al. (2012); Phang (2007); Kim and Moon (2011); Kuo (2012); Takayama (2002); Moon (2009, 2002); Towers Watson (2012b,a); Mandatory Provident Fund Schemes Authority (2012a); Kim (2013); Shao (2010); Ju (2011); Ernst & Young (2012)

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criminal offence. Compliance can be avoided by under-reporting the number of employees or their earnings - an issue especially prevalent among the self-employed and SMEs. In Chinese EAs for example, there are no mechanisms to prevent non-compliance (e.g. Takayama, 2003a; Zheng, 2011; Takayama, 2012c; Oksanen, 2012; Shi and Mok, 2012b; Leckie and Xiao, 2012, for more details in each country).

Tables 17, 18 and 19 detail the main parameters of East Asia's DC schemes.

A striking point, given the global trend towards DC pensions, is the lack of development of DC plans in Japan, a developed economy that started pension reforms much earlier than other countries in the region. The main explanations given in the literature are:

- Contribution ceilings are too low (Nomura, 2012)
- Premature withdrawals are banned (Takayama, 2012c)
- Funding complexity preventing EPFs (DB plans discussed in section 4 from converting to DC (Clark and Mitchell, 2002)
- The phasing-out of DB vehicles, such as TQPPs and EPFs, is slow. Nakada (2005) observes that 70% of DC plans were formed with transfers from TQPPs

It is fair to say that public and corporate DB pensions have so far crowded out DC schemes in Japan. It remains an open question whether similar dynamics between plan types will be observed in countries with similarly diverse pension systems e.g. Korea.

5.2.2 Keeping costs under control

DC plans are often plagued by agency issues because employers and employees have diverging incentives: employers seek the easiest solution while employees suffer from choice inertia and time inconsistency i.e. the failure to adapt short0term behaviour to long-term objectives (see Blake, 2006, for a review). Inevitably, incentive misalignment combined with information asymmetries creates sizeable opportunities for rent-seeking on the part of financial service intermediaries.

Management, investor education and investment fees are important parts of DC plan design. They are shared between employers and employees. This topic is not well documented in East Asia and is only marginally covered internationally, signalling an insufficient focus on cost - a shortcoming which can affect accumulation in DC plans materially.

For example, Stewart and Gomez Hernandez (2008) propose using the charge ratio for cross-country comparisons - a measure which captures the impact of costs throughout a 40-year accumulation period. They highlight that voluntary systems tend to have higher charge ratios - a testament to the importance of economies of scale. Figures 43 and 44 show the results of their study. Figure 45 offers additional insight into the breakdown of these fees.

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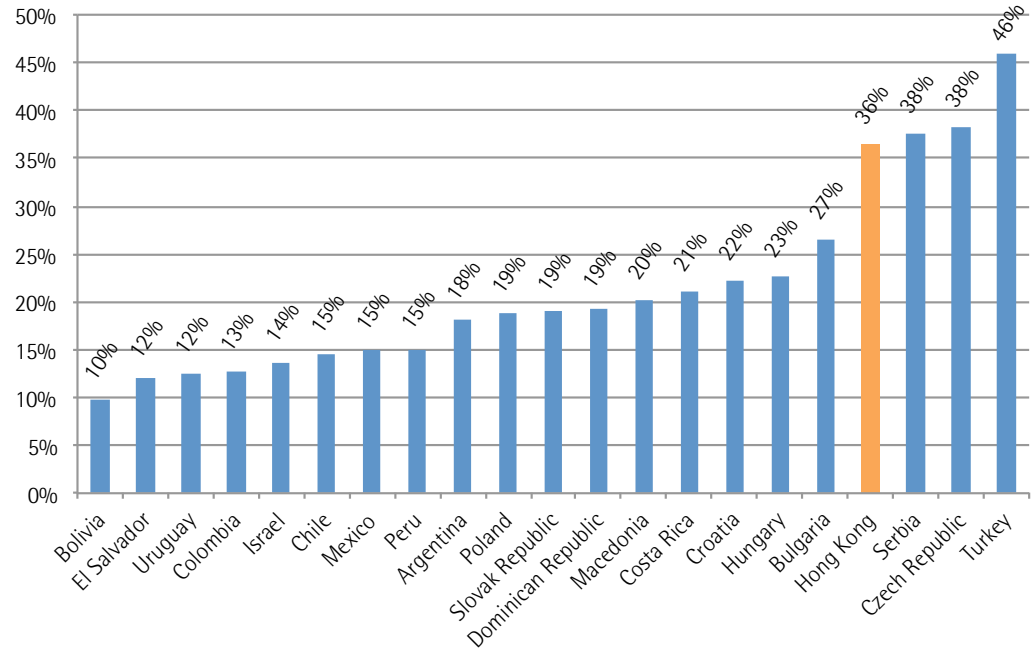
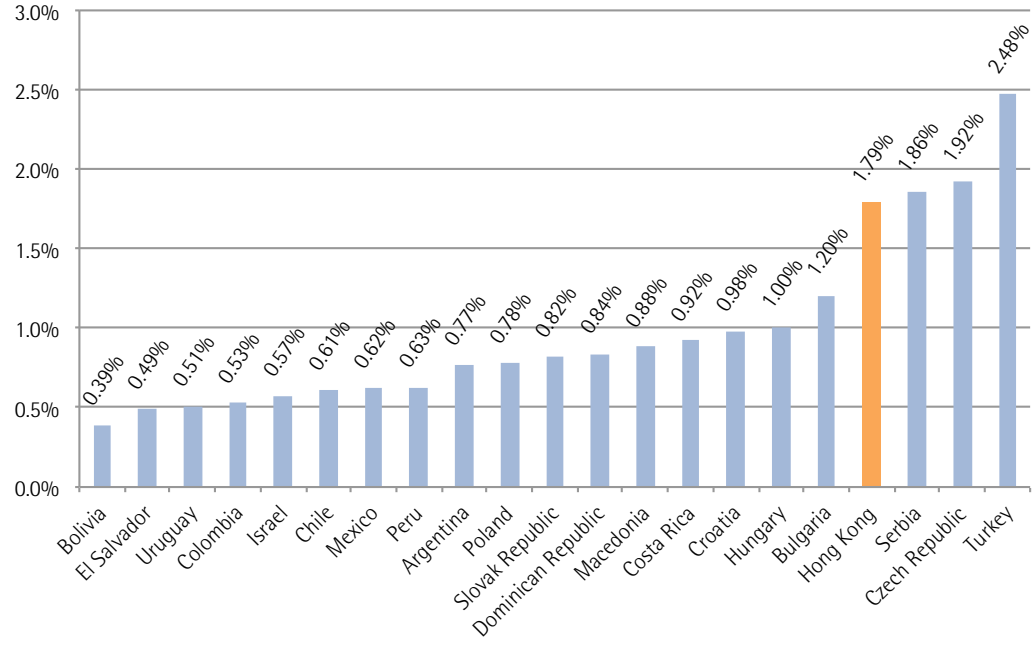
Figure 43: Charge ratios in DC Plans around the world



Source: Stewart and Gomez Hernandez (2008)

Figure 44: Equivalent annual fees in DC plans Around the world



Source: Stewart and Gomez Hernandez (2008)

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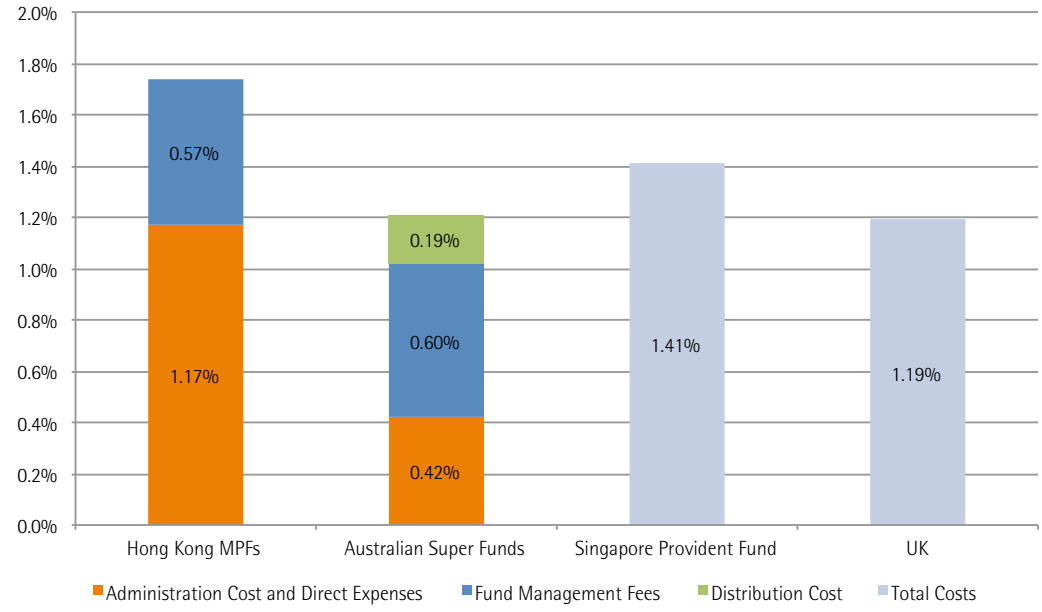
Figure 45: Comparison of Costs in Major DC Systems



Source: Ernst & Young (2012)

In Japanese DC plans, employees carry the majority of investment costs, but employers bear the full administration and education expenses.

In Hong Kong, fees have been rising steadily and discussions are ongoing to cap fees (Ignites Asia, 2013a) after the regulator declined to create a national MPF trustee (Ignites Asia, 2012a). According to Shi and Mok (2012a) and Ernst & Young (2012), fees in Hong Kong are considered high and often halve, if not exceed, average annual returns. The MPFA is aiming to introduce more low-cost solutions for its members.

In stark contrast, China's EAs' fees are considered too low - they are capped at 1.2% of assets, whereas the minima are 0.6% for plans with equity allocations and 0.3% otherwise (Leckie and Xiao, 2012). The investment management sector is very recent in Mainland China and consists mostly of foreign firms operating in local joint-ventures (JVs) and transferring their know-how directly or indirectly to local players.

5.2.3 Individual choice and default options

Choice in DC plans is usually made at two levels: the ability to choose a pension fund (level I), and the ability to choose investment options within that fund (level II).

Not all DC systems in East Asia offer choice. For example, Hong Kong's MPF and Korea's corporate DC plans allow both types of choice, with some limitations, while other DC plans in these two countries allow only level II choice.

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Table 20: Choice levels in DC Schemes in East Asia

Country	Plan	Level I Choice	Level II Choice	Details
Hong Kong	MPFs	●	●	Two levels of choice are offered from 2012 onwards, but employees can only choose the MPF in which their individual contributions are placed. Investment choice was available prior.
Korea	Corporate DC plans and IRPs	●	●	Employees can choose between DB and DC pensions, or a combination of the two, if offered by their employer, since 2011. Investment choice was available prior. At least one option with a principal guarantee should be offered.
Korea	IRAs	○	●	If the IRA is sponsored by an employer, the employee does not have choice of pension fund.
Japan	All DC plans	○	●	Japanese DC plans must offer a choice of at least three investment options and at least one should have a principal guarantee. Investment options usually include a bank deposit, an insurance contract and mutual funds.
Taiwan	LPF	○	○	This is a mandatory, publicly managed, collectively invested scheme.
China	USI IAs	○	○	This is a mandatory scheme which must be invested only in bank deposits by law.
China	EAs	○	●	Chinese EAs offer investment choice too but not consistently. As of 2009, they were not offering guaranteed principal products.

Source: Takayama (2012c); Phang (2007); Hong (2011); Moo (2009)

Conversely, China and Taiwan offer very little choice, if any. Table 20 summarises choice systems in East Asia.

When individual choice exists, the existence and design of a default option makes an important difference. They are crucial due to the inertia in individual investment decision, the lack of knowledge on even the simplest investment concepts, and the general difficulty in implementing a good investment strategy even for someone knowledgeable.

Behavioural research concludes that individuals rarely look past the default option of plans, even when they have control over the investment choice (Muir, 2012). There is a lot of inertia in individual investment decisions which, rather than following a thought-out strategy that is revised according to circumstances, are made once and for all. If the option that is chosen does not take into account the changing nature of market and individual circumstances, it can prove disastrous.

The investment strategy, when there is one, often suffers from a number of severe shortcomings. There is often an over-concentration in domestic assets (home bias), in certain asset classes, equity in particular, and in certain assets within those classes (including sometimes the employer's stock!). Kimball and Shumway (2010) study these three puzzles and find that those harmful behaviours are correlated with the degree of sophistication of investors, with less knowledgeable investors being more likely to commit those mistakes.

Default investment options in East Asia are not regulated (i.e. when they exist explicitly, they are entirely plan dependent).

In Korea and Japan, principal-guaranteed products are the implied default investment option, but it is not a regulatory requirement. However, more recently some Japanese DC plans made investment trusts their default option (Nomura, 2008).

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Similarly, in Hong Kong the default option is commonly a cash or balanced solution, but there is no regulation guiding the choice of default options (Watson Wyatt, 2008). Cash will be too conservative for a large majority of pensioners, and the balanced fund will be appropriate for very few at any given time. These default option do not take into account the employee's objectives, risk tolerance and other constraints when they are entered into or subsequently. With a view to protecting workers' welfare, default options should explicitly account for lifecycle effects as well as differences in risk tolerance across individuals.

Because significant freedom exists for employers when setting the default option, a more robust framework for the selection of default DC options within MPFs was being considered in 2012. An additional level of choice, allowing individuals to choose their scheme independently of their employers' chosen scheme (level-1), was also introduced in 2012 (Ignites Asia, 2013b).

In effect, too much choice can also be costly. Despite individuals' tendency to choose the default option, DC plans with level-2 choice often offer numerous investment options, thereby reducing economies of scale. This phenomenon is well documented in Australia's superannuation system. The information overload then exacerbates the paradox of choice, and investors tend to fall back on familiar (if suboptimal) products.

This can be an issue in East Asia as well. For example in Japan, DC plans offer on average 15 investment options, yet more than 60% of assets are held in insurance contracts and bank deposits (Nomura, 2009).

Regulated default options, both pre- and post-retirement, are necessary considering the reluctance of members to exercise choice, their questionable ability to make sound investment decisions, and the cost of choice and overcapacity for a pension system.

5.2.4 Exposure to non-financial risks

If it is unrealistic to expect plan members to manage investment risk themselves, then certainly expecting them to deal with non-financial risks is even more so.

Transparency is paramount and sufficient in the institutional investment industry but for retail investment solutions, the regulator has a duty to ensure that pensioners are not subjected to non-financial risks or that reasonable mechanisms exist to protect them against their consequences. For example, in the context of the UCITS vs. draft Directive, Amenc and Ducoulombier (2012) suggest the creation of a subset of the UCITS (Undertakings for Collective Investment in Transferable Securities) label where non-financial is virtually eliminated through restrictions on eligible investments, operations, and jurisdictions thus allowing the depositary to safe keep all assets and return these.

Governance should emphasise clarity on the investment strategy followed, and make sure assets are properly segregated by independent depositaries. Depositaries also

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have a part to play in guaranteeing the safekeeping of the assets (Amenc et al., 2012).

For example, the Hong Kong MPFA, as the supervisory authority responsible for approving constituent investment funds, has an implicit fiduciary duty to all members to protect their interests, jointly with the Securities and Futures Commission (SFC).

Default options can also help deal with non-financial risks. The complexity of regulatory rules, notably regarding depositaries and safekeeping, and the lack of a clear international jurisprudence protective of final investors, may expose plan members to future hardship in the form of loss of assets. These issues are not just hypothetical. Amenc et al. (2010) analyses some striking examples of how mismanaged non-financial risks often materialise at the expense of the individual investors (see Amenc et al., 2012).

5.3 Improving DC funds' investment strategy

As we argued above, DC plans are unlikely to grow if they are neither mandatory nor offer an attractive retirement investment solution.

Next, we discuss how observed investment practices in East Asia's DC plans still require to be framed in a long-term, lifecycle and risk control investment setting.

Without well-designed default options, DC plan members, or their collective managers in the case of collective DC (CDC) plans, are left with the challenge of designing their own investment strategy.

5.3.1 Defining explicit long-term liabilities

A possible hindrance to the implementation of an adequate management strategy for defined-contribution funds is the lack of explicit liabilities, contrary to defined-benefit plans.

It helps to define a target wealth rather than taking whatever is in the fund at retirement. If liabilities, i.e. some explicit objective for the fund, can be defined, then a more formal asset-liability management strategy can be established (Martellini and Milhau, 2012), which results in solutions involving building blocks for performance and hedging of risks (such as inflation risk, interest rate risk, or even contribution risk), and a dynamic allocation between them that takes account of the horizon- and state-dependency in assets. An explicit objective notably allows to give up some of the upside ("overfunding" of the objective) to lower the cost of purchase of downside protection (see for instance Martellini and Milhau, 2012).

Another recent alternative approach aims to minimise the probability of lifetime ruin rather than achieve a defined wealth target (Bayraktar et al., 2011).

In general, the setting of the investment objective is of tremendous importance in DC plans, yet the degree to which individual objectives differ and how well they align

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with financial theory has been underestimated.

22 - Incidentally, such a rule would give extremely high allocation to the risky component even very close to retirement.

5.3.2 Dynamic lifecycle investing

Static strategies, although widespread, are inadequate for retirement solutions. Antolín et al. (2010) examines default investment options in DC plans and finds that fixed portfolio strategy severely underperforms dynamic strategies. Static strategies notably fail to recognise the investment horizon of the pensioner, and yet someone close to retirement should be less willing to take on risks, everything else being equal, than someone freshly entering the workforce.

This level of investment, then, should not be fixed over time, but much to the contrary, should be time-dependent. However, it should also be state-dependent, that is reflect the relative prices of the different assets in the investment opportunity set, their expected returns, volatility, and correlations.

One quick-fix solution to remedy the horizon effect has been to use a so-called deterministic glide path (Antolín et al., 2010). The idea is quite simple: the investment is divided between a risky component (usually equity) and a component deemed riskless (usually fixed income) with a fixed horizon.

As the horizon gets closer, the percentage of the allocation to the risky component will decrease following a predetermined formula (generally linear). These strategies have become known as "100 minus the age" or "120 minus the age", after the typical rule-of-thumb corresponding to the fraction to be invested in risky assets [22].

It is widely recognised, however, that these strategies are suboptimal (Antolín et al., 2010; Martellini and Milhau, 2010). While they incorporate the horizon effect, they do so in a simplistic manner and they also ignore the stochastic nature of the investment opportunity set. Furthermore, used on their own, they typically offer no protection against shortfalls, as investors have recently become painfully aware.

The financial crisis has durably damaged the reputation of these "target-date funds", with near-term TDFs losing large shares of their assets, but somewhat unjustly since their current implementations are to blame, rather than the concept itself.

There is limited evidence of lifecycle solutions in East Asia, be they target-date funds or others implementations.

Lifecycle funds exist in Japan, Korea and Hong Kong, but there is little information on how widespread their use in the region is. About 10% of Korean DC assets were in balanced mutual funds or lifecycle funds as of 2010 (IPAsia, 2010b). The percentage is similar in Japan (Nomura, 2010).

In Hong Kong, some MPF schemes have been proposing a `lifestyle fund' as a default option since 2011 but interest is reportedly limited (Ernst & Young, 2012).

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5.3.3 Optimal asset allocation

The building blocks that go into the strategy should themselves be optimally designed. An equity index is frequently used as a proxy for risky assets and sovereign bonds matching the horizon of the investment as the riskless asset. There is only one advantage to this practice: the relative low costs of implementing the strategy. However, these proxies are suboptimal in all other dimensions. They are not good representation of the asset classes available to most pensioners, and therefore forego diversification benefits from considering a broader investment universe. Indices Furthermore, they are not good investment benchmarks for the asset classes that they represent, i.e., they do not optimally capture the premia associated with the risks taken; popular indices that have capitalisation-based weights and as such will mostare typically likely besuboptimal from a risk-return point of view and over concentrated; such indices are so under diversified, and thus suboptimal with respect to the risk-return trade-off, to such an extent that a simple equally iweighted "1/N" scheme can beat them on a risk-adjusted basis (DeMiguel et al., 2009).

The idea is then to maximise the probability of reaching the goal under some short-term constraint. By explicitly capping the performance at a certain threshold, the cost of downside protection can be reduced. There are many variants of this approach depending on the asset classes that are considered, the exact methodology chosen for the modelling and estimation, and the type of constraint imposed.

In terms of investment strategy, the idea has become rather consensual that some variant of a life-cycle approach should be followed.

Antolín et al. (2010) discusses the different elements that should be put together to create a good retirement solution. The strategy should, first and foremost, recognise the life-cycle dimension of the investment problem. This means that the optimal portfolio should explicitly account for the investment horizon but also the risk tolerance of the investor (see Gomes et al., 2008; Viceira, 2008, among many others), as those two parameters will determine how much should be allocated to risky assets.

When designing packaged products, it might be difficult to perfectly customise these strategies to each investor, but a reasonable approximation does not necessary lead to drastic welfare losses (see for instance Martellini and Milhau, 2010, and the elements below on packaged products).

Restrictions to asset allocation

Japan's DC plans are not subject to much statutory restrictions (only real estate is not allowed) and Taiwan's collectively managed LPF does not have investment restrictions.

However, both asset allocation weights and asset classes are subject to statutory restrictions in member choice systems such as Hong Kong's MPF schemes, Korea's DC plans, and China's USI individual accounts and EAs. While such restrictions may be motivated by the protection of retail investors, they can also restrict the option menu to low yielding

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assets, to the detriment of asset accumulation.

- In Korea, there is a ban not only on individual stocks, but also on equity funds and even balanced funds. Korean DC plans invest exclusively in deposit accounts and principal-guaranteed insurance products, as well as investment products where total equity exposure cannot exceed 40% (Moon, 2008; Nomura, 2010).
- In Hong Kong, prohibited assets and strategies include lending, direct property, loans, mortgages, jewellery, art and collectibles (Holzmann et al., 2000), securities borrowing and unlisted equity. Restrictions apply to derivatives hedging, repos, stock investing, investment-grade debt securities, convertible bonds, listed warrants, lending and leverage. Commodities are capped at 10% and may include gold ETFs since April 2013.
- Chinese USI individual accounts have to be entirely invested in deposits and government bonds (Leckie and Xiao, 2012), except when assets have been transferred to NSSF.
- Chinese EAs can invest up to 30% in equities and are required to allocate at least 20% to government bonds and deposits. The minimum cash equivalent required allocation has dropped to 5% from 20% before 2011. The equity allowance in EAs is greater than other voluntary individual products (Zheng, 2011; Leckie and Xiao, 2012).

Some of these restrictions are clearly counterproductive and while they might prevent individuals from taking overly risky positions in certain asset classes, at the same time they effectively prevent the adoption of modern asset-liability management practices which would maximise the probability of attaining the long-term objective while respecting short-term prudential constraints.

Asset allocation preferences

Two paradigms exist amongst East Asia's DC plans: a very conservative stance focused on capital preservation (Japan, Korea, China) and a more balanced but also very active approach favouring capital growth (Hong Kong, Taiwan).

In Korea, China and Japan, restrictions on asset allocation and allowed instruments are stricter than for reserve funds and corporate DB plans, which limits the appeal of DC products – and indeed guaranteed products are the preferred investment choice in these three markets, especially in schemes with member choice. Guarantees include minimum interest rates, capital protection or both.

Japanese DC plans are fixed-income oriented, although this not the result of investment restrictions (Nomura, 2010).

Chinese EAs invest more than 80% on average in cash and fixed income (Zheng, 2011).

Investments in non-traditional asset classes are rare. As of 2012, Taiwan's LPF was the only one preparing for alternative investments, including overseas absolute return strategies, overseas REITs and international

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Table 21: Aggregate asset allocations of DC Schemes in East Asia, 2011

Country	Scheme	Equities	Domestic Equities	Int'l Equities	Fixed Income	Domestic Fixed Income	Int'l Fixed Income	Cash & Short Term	Other
Japan	DC Schemes	12%	9%	3%	9%	5%	4%	45%[1]	32%[2]
Taiwan	LPF	47%	28%	19%	31%	17%	15%	21%[1]	..
Hong Kong	MPFs[3]	62%	..	..	22%	..	..	16%	..
China	USI IAs	..	..	..	..	..	..	100%[4]	..
China	EAs[5]	11%	..	..	51%	..	..	38%	..

1 - Figure refers to deposits.
2 - Figure includes 22% principal-guaranteed insurance products and 10% balanced funds.
3 - Figures refer to aggregate averages as reported by the MPFA.
4 - Figure includes an unspecified plan dependent amount of government bonds.
5 - Figures are aggregate averages as reported by Zheng using MHRSS data from 2010.

Source: Annual reports

Table 22: Aggregate DC allocations by vehicle type, 2011

Country	Scheme	Bank Deposits & Cash	Guaranteed Products	Other	Equity Funds	Fixed Income Funds	Lifecycle Funds
Hong Kong	MPFs	0.3%[1]	22%[2]	42%[3]	34%	2%	●
Japan	DC Schemes	45%	22%	33%[4]	..	..	●
Korea	DC Schemes	N/A	65%	10%[5]	N/A	N/A	●
China	USI IAs	100%[6]	..	..	..	..[6]	◌

1 - Figure refers to money market funds.
2 - Figure includes capital preservation funds and guaranteed funds.
3 - Figure refers to balanced funds.
4 - Figure refers to investment trusts and other types of instruments including lifecycle funds.
5 - Figure refers to balanced mutual funds and lifecycle funds.
6 - Chinese USI individual accounts are known to be held primarily in deposits but a plan dependent portion is allocated to government bonds.

Source: Annual reports

commodities (Ignites Asia, 2012b), but first allocations were yet to be made.

The polarisation of allocations choices described in table 21 is sometimes explained in the literature as the result of limited financial market development.

For example, Hong Kong and Taiwan are known to have underdeveloped debt markets, which offers an easy explanation for the higher allocations to equities in these two jurisdiction (see Figure 46). Similarly, Shi and Mok (2012b) claim that financial markets were underdeveloped in Mainland China long after pension pooling began, which may help explain the historical lack of asset management.

However, in Japan, which is a sophisticated economy and has advanced financial markets and institutions, investment choices continue to be extremely conservative. The level of financial expertise is thus not the only factor contributing to the underdevelopment of DC investment – regulation definitely has a role to play.

5.3.4 Packaged products

Unfortunately, default options are still too often following a rather inappropriate strategy as previously described, under the pretence that plan members can select and implement more suitable strategies should they wish to. They should then take the relatively vanilla, not self-sufficient products and combine them in an optimal

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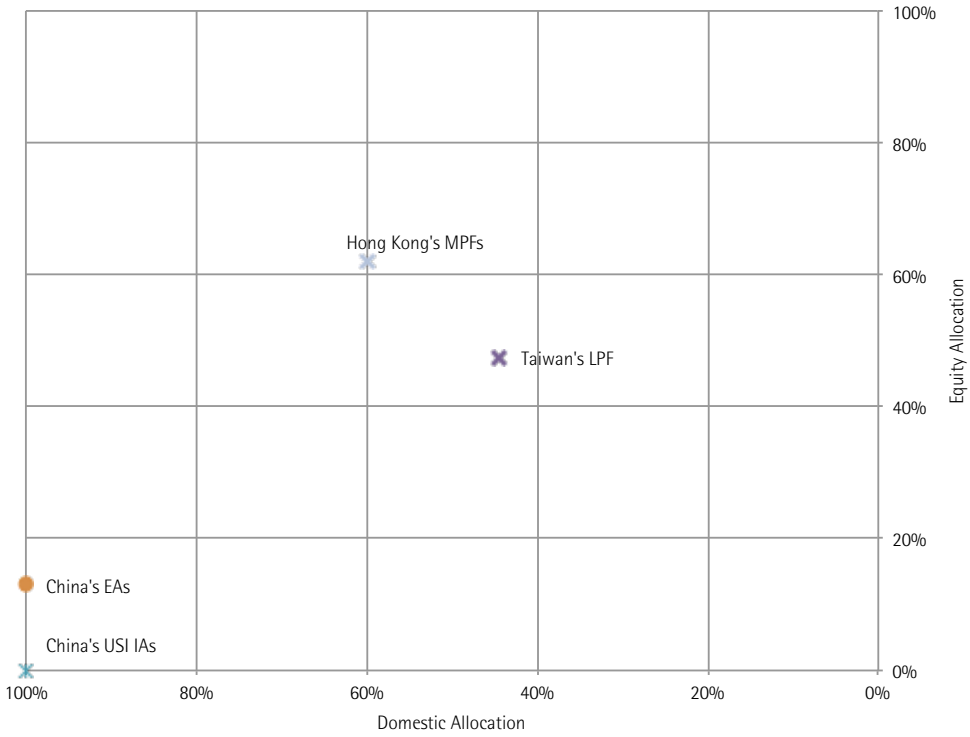
Figure 46: Domestic and fixed income biases in DC Schemes in East Asia, 2011



Source: Annual reports

fashion to cater to their own needs, preferences, beliefs and wealth. They should implement the proper safety mechanisms to respect short-term constraints while maximising the probability to reach long-term goals.

It hardly seems reasonable to expect retail investors to have the resources to make such investment decisions on their own. The probable result, then, is that individuals will stay poorly diversified and exposed to risks they do not even know they bear. Alternatively, they will pay hefty premia for black-box products that claim to fulfil their requirements, with often little to prove it.

When designing retirement solutions, it is important to recognise that not all investors can have perfectly customised investment strategies, hence the need for packaged retirement products.

Martellini and Milhau (2010) tackle the question of designing better target-date funds that conform to the generally accepted best practices for asset-liability management. One problem is that, for most plan members, it is too costly to follow a customised investment strategy that would incorporate the specific characteristics of the individual, especially regarding investment horizon and risk preferences.

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Martellini and Milhau (2010) show that it is possible to find a reasonable partition based not only on time, as it currently the case, but also on risk aversion, which allows to get much closer to the optimal investment strategy.

5.3.5 Post-retirement solutions

An important and oft-overlooked issue is the payout options of the DC plan. A lump sum payment at retirement is in itself inadequate. The pensioner is effectively incapable of hedging against his own longevity risk, and needs to purchase an insurance policy or an annuity.

Longevity risk is the risk for the pensioner to outlive her savings, and it is a major issue found in DC plans. While on a collective level, longevity risk can be addressed through risk pooling (insurance), on an individual level annuitisation is the only way to manage this risk through market mechanisms.

Annuitisation, which embeds the cost of longevity risk, is mostly voluntary throughout East Asia's DC plans and is likely to remain at its current embryonic state without any new regulatory initiative.

The underdeveloped market for annuities

Worldwide, the annuity market is insufficiently developed where annuitisation is not mandatory (Mitchell and Piggott, 2011).

Purchasing an annuity might come at a significant premium. Brien and Panis (2011) look at the issues in the market for annuities and argues after Brown (2008), that there might be a number of rational explanations for them.

The premia might pay for adverse selection, as people who annuitise tend to live longer than average. Other types of benefits (public pensions) might already provide a form of annuitisation. There might be risk sharing and bequest motives within family units which would lead to under-annuitisation, although it is not clear how important these actually are. Finally, there might be a number of shortcomings in the annuity market, such as the inadequate protection against certain risks for consumption (notably inflation).

Among the packaged variable annuity products, a number of safety "add-ons" are available, notably for inflation protection, under various forms of guaranteed minimum benefits. Common examples include some combination of ratchets and roll-ups at quarterly or annual frequency. The fairness of pricing of those options, however, is quite difficult to assess for the buyer.

Other insufficiency in the annuity market could include the bankruptcy risk for some of the annuity providers which is difficult to hedge against (although the regulator might then step in to mitigate the impact).

Annuitisation in regional DC plans is mandatory only in the case of Taiwan's LPF since 2009 and for new members. It is also possible in Japan is the account balance and contribution period are sufficient, However, even in these systems, members can choose

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a lump sum in case they do not meet the criteria to receive an income stream.

Korean reform in corporate pensions has set the goal to improve annuitisation by offering income streams over 15 years - at present, only fixed term annuities with five-year durations are available (Ignites Asia, 2013c).

In China, variable annuities have been launched as pilots only recently (IPAsia, 2011).

Towards mandatory annuitisation?
Voluntary annuitisation is unlikely in the presence of a riskless income stream from national pensions (Sakamoto, 2010, among others).

Moreover, member preferences for the lump sum in Japan, for example, are driven by a lack of trust in the employer's financial strength, more favourable taxation, the possibility of benefit reduction, the desire to pay off mortgages (Urata, 2009) and a tendency to avoid voluntary annuitisation in the presence of a national pension paid monthly. The Japanese annuity market is the most developed in the region but it remains small (Mitchell and Piggott, 2011) and is dominated by fixed-term annuities with 10-15 year duration (Urata, 2009).

The issue of longevity risk is most prominent in Hong Kong, where MPFs comprise the only mandatory pension system, yet do not offer post-retirement solutions.

Mandatory annuitisation should be seriously considered in mandatory DC systems, especially where they comprise a large portion of pension assets (e.g. Taiwan and Hong Kong).

5.4 Conclusion

In this section, we have reviewed the development and some potential improvements of defined-contribution plans in East Asia.

DC options now exist in Hong Kong, Japan, Korea, Taiwan and China. In Hong Kong, they were introduced twenty years ago as a voluntary type of occupational pension plan before becoming the main mandatory pension scheme in 2000, as well as the largest DC system in East Asia.

Japan introduced voluntary individual DC accounts in 1991 and corporate DC schemes ten years later. Elsewhere, DC plans have only existed for less than a decade. Mandatory DC exists in Taiwan since 2005. In Korea, mandatory DC plans have only existed since 2011, contingent on employers not choosing to establish DB plans instead.

Thus, with the exception of Hong Kong, DC plans remain a marginal dimension of the pension system in the region, even though assets are beginning to grow in a number of jurisdictions, especially Taiwan.

In 2012, DC assets represented 30% of GDP in Hong Kong, but less than 5% everywhere else in the region. In Japan, where DC plans have existed for more than a

5. Improving Defined-Contribution Plans

decade but remain voluntary, cumulative assets amount to less than 2% of GDP.

The well-documented shift to DC pensions in other parts of the world has nevertheless begun in the region: except in Hong Kong, where DC coverage is higher, assets are growing rapidly in other countries, albeit starting from a low base. In Taiwan, where DC has been made mandatory, membership growth reaches 10% per year.

In countries where DC was only introduced recently and alternative options are available (e.g. Korea), it remains to be seen if this growth will continue or not. Indeed, both firms and employees may continue to prefer corporate DB plans.

Pension schemes are supposed to create incentives to save on the one hand, and to help manage these savings to meet lifecycle consumption objectives on the other.

However, as discussed above, East Asia already has very high household and domestic savings rates and, in effect, exhibits excess savings at both micro and macroeconomic levels. Incentives to save more are thus likely to be redundant. **The key question is one of creating incentives to save into dedicated pension schemes that are designed to support post-retirement consumption objectives.**

So far ,DC schemes in East Asia mostly fail on both counts. They create few if any incentives to use them instead of regular savings accounts. They also fail to offer much post-retirement investment solutions that would justify channelling existing savings into such accounts.

First, when plans are voluntary, incentives are limited because employees are either not allowed or not incentivised to save in DC plans. The employer also often acts as a filter to have access to DC plans, even individual ones. But employers are also given scant tax incentives to choose this option.

Mandatory DC schemes may also have vesting and portability issues and compliance with regard to meeting contributions is variable in some jurisdictions. Contribution ceilings can also be set very low and minimise the use of such plans.

Second, like the immense majority of private pension schemes in East Asia, DC schemes, whether they are corporate or individual plans, do not offer any post-retirement income but instead pay a lump sum.

Annuitisation is possible in some cases but typically not for a long period and annuity markets are generally small and expensive (especially in a macroeconomic environment in which interest rates are durably kept artificially low as discussed in section 2).

It follows that **in order for DC plans to develop and help resolve the issues of funding lifecycle deficits of ageing populations in East Asia, they need to be made more accessible and attractive and they need to contribute to providing**

5. Improving Defined-Contribution Plans

post-retirement income solutions, as opposed to a very inefficient form of savings substitution.

Next, our review highlights the following stylised facts about DC plans in East Asia.

Hybridity

- Hybridity or the level of risk sharing between plan sponsor and plan contributors, is limited in DC plans available in the region.
- Individual accounts in Hong Kong and China typically correspond to the `pure' form of DC plans, in which individuals bear all investment risk and must decide on an investment strategy.
- Collective DC schemes in Taiwan or in some cases in Japan offer some risk pooling.
- Principal guarantees and indexation clauses are available in some jurisdictions, especially in Korea, Taiwan and Japan.

Incentives to save

- Contribution rates are usually set at inappropriate levels; both minimum and maximum levels can be too low.
- The tax deductibility of contributions for the employer is either insufficiently attractive or unclear.
- Guarantees, when they exist, are seldom taken into account in the investment strategy.
- Vesting and portability can be unattractive in the case of early occupational DC schemes, even though this aspect has improved in recent years.
- High compliance with regard to employer contributions exists only in Hong Kong, where non-compliance is a criminal offence.

Costs

- Costs are considered to be high in most systems. Low-cost investment solutions, among other things, can help improve cost-efficiency.
- China is an exception and managers' fees are capped at a level considered too low.

Choice and default options

- Most DC plans in the region offer a choice of investment options to plan members, but not Chinese or Taiwanese plans.
- Only Hong Kong and Korea offer a choice of pension plan provider.
- Regulated default options do not exist. Default plans are typically low risk, principal guaranteed products or balanced funds, neither of which is appropriate from a lifecycle point of view.
- Investment options can also be too numerous in Japan or Hong Kong for example, leading to the well-documented `choice paralysis'.
- Non-financial risks, especially to do with regulatory change, are seldom understood or taken into account.

Improvements

5. Improving Defined-Contribution Plans

- DC plans, like any pension investment solution, should define long-term objectives either in terms of target wealth or extreme event minimisation, thus allowing a proper asset-liability approach.
- Lifecycle approaches that take the investment horizon of the participants into account should be standard and improve on existing static approaches found in `target date' and `lifecycle funds' by applying a dynamic investment solution.
- Asset allocation must be designed using adequate building blocks in order to maximise diversification benefits.
- However, fully customised solutions are too expensive for retail investors and pre-packaged standardised ones must be made available to respond to a range of post-retirement investment needs.
- In markets where DC plans are mandatory and may even be the only pension system available (e.g. Hong Kong), forms of mandatory but regulated annuitisation should be considered by the regulator to support the development of an annuitisation industry, while ensuring competitive prices.

6. Conclusions

6. Conclusions

In conclusion, while the demographic and investment challenges that characterise the issue of retirement planning and income generation in East Asia are significant and seemingly intractable, addressing the regulatory challenge discussed above in relation to pension reserves, corporate and occupational defined-benefit plans and corporate and individual defined-contribution plans can go a long way to address the first two sets of issues that we have identified: demographics and the financial distortions introduced by the development model of East Asia's economies.

Demographic trends are difficult to offset or reverse and the rise of lifecycle deficits documented by Lee and Mason (2011) suggests that in the absence of new sources of income to support the increase of per capita consumption of the elderly in an ageing society, serious consequences can be expected in terms of either fiscal stability or inter-generational social frictions.

Crucially, the pace of population ageing in East Asia leaves little time for adaptation and spreading the cost of the last stage of the demographic transition over several generations.

Likewise, structural financial distortions and macro-economic imbalances create an investment environment for pension savings in which a number of standard hypotheses of academic finance, such as mean reversion, may not apply for long enough to make horizon-based investment strategies effective and benchmarking the building blocks of an optimal diversification strategy more difficult. In turn, this may increase the need to invest internationally to offset such distortions.

Moreover, the longer the eventual re-balancing of some of East Asia's main economies takes, the more painful it is likely to be for a whole generation of savers. As the rebalancing of Japan from the 1990s onwards illustrates, a multi-decade slump can follow a balance-sheet recession, making long-term investment planning difficult.

However, the introduction of scientific investment concepts into the design of pension savings plans will only make these issues more explicit and contribute to a necessary regulatory and macro-prudential debate about the future of such fast ageing societies.

For funded pension systems to deliver levels of wealth in real term that are commensurate with post-retirement consumption objectives, scientific solutions identified in the literature recommend the combined implementation of three investment paradigms: (i) Liability-driven investment or LDI; (ii) lifecycle investment or LCI; and (iii) risk control investment or RCI as defined in Cocquemas (2013):

- Pensions are long-term liabilities, which are in fact dynamic and depend on several time-varying factors. Pension solutions should therefore be designed in order to maximise the likelihood of meeting those

6. Conclusions

liabilities at the horizon. This is the liability driven investing (LDI) framework.

- Furthermore, the horizon of the investor needs to be taken into account formally. As they approach retirement, plan members should be exposed to less risk. The strategy, notably the amount of risk taking, should be dynamic depending on the current wealth and future expected performance, and should explicitly consider the investment horizon. This life-cycle investing (LCI) dimension is therefore crucial to meet the needs of plan members.
- This strategy needs to be implemented while managing risk levels: there need to be short-term constraints too, which take into account the existence of a sponsor when there is one. These constraints can either be self-imposed or defined by the regulator. This is the risk-controlled investing (RCI) approach.

In this context, several important points can be made regarding the improvement of funded pension plans in East Asia:

Investment solutions for pension reserves can help mitigate the impending public pension crisis

As we have argued above, the existence of these large reserves represents a **unique opportunity** for East Asia's government to address the un-sustainability of public pay-as-you-go pension schemes resulting from population ageing.

Seizing this opportunity will require making fundamental changes in the way reserve funds have been controlled and managed for the past decades, and adopting investment management processes and tools that will allow pension reserves to achieve what should be their sole objective: to support the public pension system by minimising the burden of pension liabilities on future generations while ensuring adequate public pension provision.

The main changes required include clearly defining the long-term objectives and short-term constraints of reserve funds, and putting in place the governance mechanisms that guarantee that they only attempt to achieve these objectives while respecting binding constraints.

With well-defined objectives and constraints, adequate scientific investment solutions can be defined and implemented, and, in turn, the sustainability of public pension system can be greatly improved.

Defined-benefit, corporate and occupational plans can improve both sponsor and member outcomes if adequate investment management is implemented

As we have discussed above, voluntary schemes have not led to the creation of a strong corporate pension sector, but instead have become an avatar of the retirement allowance preference that has historically defined East Asian corporate culture.

Corporate DB pensions in East Asia play a role as a source of deferred pay to reward loyal employees and provide long-

6. Conclusions

term incentives to managers, as has long been recognised in the practice and in the academic literature, but they do not provide retirement income.

Two types of improvements should be considered for private DB plans in the region: improvement for sponsors and for members.

First, DB plans need to improve their funding levels and volatility in the context of more stringent regulation and the need to minimise demands on the sponsor since higher contributions may not be economically feasible. For this purpose, the simple application of asset-liability management models, while it allows for capital preservation and freeing up a risk budget to improve profitability, would not be optimal for an occupational DB fund backed by a sponsor. ALM models should explicitly account for the implicit guarantee of the sponsor, and recognise that this guarantee is more or less risky depending on the health of the sponsor.

In this context, short-term funding ratio constraints would not be costly for pension funds if they were not reluctant to implement risk-management strategies that are optimal given such constraints. Smarter surplus sharing rules should be encouraged. In particular, giving plan members access to part of the surplus will encourage more risk-taking, which is typically in the interest of the sponsor, while imposing a cap on the terminal funding ratio can allow the purchase of downside insurance and improve the safety of the investment strategy.

Second, since East Asia's DB funds in their immense majority only pay a lump sum, longevity and most inflation risk remains with members, making private DB plans a crude type of hybrid plan. Along with the surplus sharing suggested above, greater risk sharing between plan members and sponsors during the post-retirement period can be envisaged even though it may require a regulatory intervention to be possible.

The development of mandatory annuitisation as already proposed in Singapore, along with financial contracts allowing the management of longevity risk for sponsors are amongst the solutions requiring future developments of East Asia's financial sector and markets.

Defined-contribution plans remain to be developed into attractive savings vehicles for post-retirement income generation

DC plans leave most risks with individuals but are expected to create incentives to save on the one hand and to help manage these savings to meet lifecycle consumption objectives on the other.

Since East Asia already has very high household and domestic savings rates, **the key question is one of creating incentives to save into dedicated pension schemes that are designed to support post-retirement consumption objectives.**

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But East Asia's DC schemes create few if any incentives to use them instead of regular savings accounts. They also fail to offer much in the way of post-retirement investment solutions that would justify channelling existing savings into such accounts.

When plans are voluntary, incentives are limited because employees are either not allowed or not incentivised to save in DC plans. Employers are also given scant tax incentives to choose this option. Mandatory DC schemes may also have vesting and portability issues and contribution compliance is variable in some jurisdictions. Contribution ceilings can also be set very low and minimise the use of such plans.

Moreover, like DB plans in East Asia, DC schemes seldom offer any post-retirement income but instead pay a lump sum.

Hence, an important issue is to incentivise the use of DC plans by creating clear and adequate incentives to use them (i.e. to channel existing and future savings into dedicated accounts offering attractive post-retirement investment solutions).

These solutions should take a long-term objective into account (e.g. target wealth) and allow for an ALM approach while taking investment horizons into account (lifecycling). They should also make the best use of low-cost investment solutions using optimally designed building blocks. Standardised packages should further reduce complexity and costs. Finally, regulated defaults should be designed with these criteria in mind.

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7. Appendix: Japan

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Table 23: Funded Pension Schemes in Japan

Scheme	Est.	Brief Description	Management	Mandatory	Eligibility	AUM (lcu bn)	% GDP	AUM (USD bn)	AUM (EUR bn)	as of
Reserves						171,800	37%	1,790	1,383	
Employee Pension Insurance (EPI)	1942	- Reserve-backed PAYG plan for private sector - Managed by the Government Pension Investment Fund (GPIF)	Public	Yes	Private-sector employees and their spouses	116,600	25%	1,215	938	2011
National Pension Insurance (NPI)	1961	- Reserve-backed PAYG plan for private sector - Managed by the Government Pension Investment Fund (GPIF)	Public	Yes	Self-employed individuals, part-time employees, unemployed spouses	7,200	2%	75	58	2011
Mutual Aid Associations (MAAs)	1949	- Reserve-backed PAYG plans for public sector (private sector voluntary MAAs excluded) - Managed by separate entities according to occupation, e.g. local government (Chikyoren), private schools (Shigaku Kyosai), municipal personnel (Shichousonren)	Public	Yes	Public-sector employees (some private-sector occupations on voluntary basis but excluded from these statistics)	48,000	10%	500	386	2009
Occupational DB						74,000	16%	771	596	
Employees Pension Funds (EPFs)	1965	- Fully funded corporate DB pension plans - Set up as separate funds by employer or occupation to manage part of public assets and accummulate additional assets	Private	No	Private-sector employees at workplaces with more than 500 staff	28,000	6%	292	225	2011
Defined-Benefit Corporate Pensions (DBCPs)	2001	- Fully funded corporate DB pension plans - Set up as separate funds by employer or occupation, or as contracts with financial service providers	Private	No	Private-sector employees	42,000	9%	438	338	2011
Tax-Qualified Pension Plans (TQPPs) *** in abolition	1962	- Partially funded corporate DB pension plans - Set up as contracts with financial service providers	Private	No	Private-sector employees	4,000	1%	42	32	2011
National Pension Funds (NPFs)	1991	- Individual annuities which can be purchased by the single or by multiples - Managed collectively by the National Pension Fund Association (NPFA)	Public	No	Self-employed individuals in provinces with at least 1000 subscribers	2,600	1%	27	21	2011
Corporate DC						11,000	2%	115	89	
Corporate DC Schemes	2001	- Fully funded corporate DC pension plans - Set up as contracts with financial service providers	Private	No	Private-sector employees	5,500	1%	57	44	2011
Individual DC						2,600	1%	27	21	
Individual DC Schemes	2001	- Fully funded individual DC pension plans offered by employers - Set up as contracts with financial service providers	Private	No	Private-sector employees	300	0%	3	2	2009

7. Appendix: Japan

Table 24: Funded Pension Schemes Paramaters

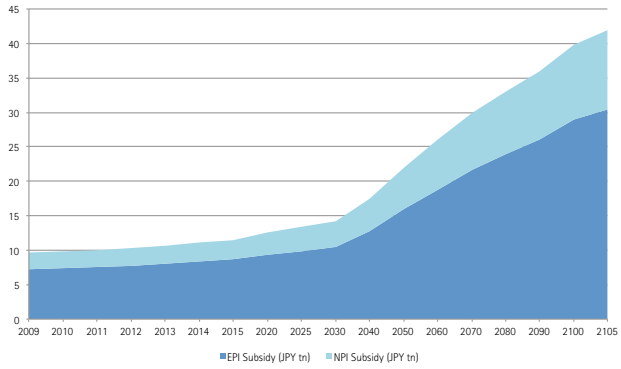
Scheme	Participants (th)	as of	Beneficiaries (th)	as of	% Empl. Population	Employer Contribution	Employee Contribution	Contribution Limits
Reserves								
Employee Pension Insurance (EPI)	34,400	2011	13,000	2011	55%	8.00%	8.00%	Dependent on assessible income
National Pension Insurance (NPI)	19,400	2011	24,000	2011	31%	None	JPY 15,100	Not applicable
Mutual Aid Associations (MAAs)	4,500	2009	3,900	2009	7%	Plan dependent, min 6.00%	Plan dependent, min 6.00%	Dependent on assessible income
Occupational DB								
Employees Pension Funds (EPFs)	4,500	2011	2,500	2009	7%	Plan dependent, usually min 2.00%	Plan dependent, usually min 2.00%	Plan dependent
Defined-Benefit Corporate Pensions (DBCPs)	7,300	2011	N/A	N/A	12%	Plan dependent	Plan dependent, max 1/2 of total contribution	Plan dependent
Tax-Qualified Pension Plans (TQPPs) *** in abolition	1,200	2011	N/A	N/A	2%	No min required	No min required	Plan dependent
National Pension Funds (NPFs)	550	2011	420	2011	1%	None	Plan dependent	Max JPY 68,000 per month including contribution to NPI
Corporate DC								
Corporate DC Schemes	4,100	2011	N/A	N/A	7%	Plan dependent	Allowed	- Max JPY 25,500 per month for employees whose employer offers a DB pension - Max JPY 51,000 per month for employees for whom the DC fund is the primary employer fund - Employee contribution may not exceed employer contribution
Individual DC								
Individual DC Schemes	132	2011	N/A	N/A	0%	None	Plan dependent	- Max JPY 68,000 per month including contribution to NPI for the self-employed - Max JPY 23,000 per month for private-sector employees whose employer does not offer a pension fund - Max JPY 25,500 per month for employees whose employer offers a DB pension - Max JPY 51,000 per month for employees for whom the DC fund is the primary employer fund

Table 25: Funded Pension Schemes Parameters (continued)

Scheme	Ret. Age	Taxation	Benefit Composition	Premature Withdrawal	Vesting or Accrual Rules	Full Benefit Eligibility	Minimum Benefit Eligibility	Indexation and Guarantees	Target Repl. Rate
Reserves									
Employee Pension Insurance (EPI)	60	Tax-exempt contributions	- Basic pension plus remuneration-related benefit paid as monthly pension - Includes survivor, disability and other benefits	No	Annual accrual of 0.55% of lifetime average salary	40 years of contributions	25 years of contributions	Wage and inflation indexation	60%
National Pension Insurance (NPI)	65	Tax-exempt contributions	- Basic pension plus flat-rate additional benefit paid as monthly pension - Includes survivor, disability and other benefits	No	N/A	40 years of contributions	25 years of contributions	Inflation indexation	N/A
Mutual Aid Associations (MAAs)	65	Tax-exempt contributions	- Lump sum allowed with less than 25 year of contributions - Includes occupational addition - Can include survivor, disability and other benefits	No	Plan and occupation dependent accrual rates	65 years of age	25 years of contributions	- Wage indexation before 65 - Inflation indexation after 65	72%
Corporate DB									
Employees Pension Funds (EPFs)	60	- Tax-deductible contributions - Benefits and investment income taxed at withdrawal - Deduction for annuities - Special rate for lump sums tied to seniority	- Basic substitutional benefit plus additional benefit - Basic benefit and at least half of the additional benefit should be paid as a life annuity - Lump sum possible for supplementary benefit with 3 years of contributions, with financial penalty - Annuity possible for supplementary benefit with 20 years of contributions	No	Plan dependent, but benefit reduction possible	- 1 month contributions for basic benefit - Plan dependent for the additional benefit but cannot exceed 20 years of contributions	Plan dependent	Guaranteed substitutional benefit	N/A
Defined-Benefit Corporate Pensions (DBCPs)	60	- Tax-deductible contributions - Partial tax deduction at withdrawal of benefits depending on their type Special corporate tax may apply to assets	- Plan dependent - Annuity benefit - Lump sum possible with financial penalty but only with at least 3 years of contributions - Hybridity possible via cash balance plans	No	Plan dependent, but benefit reduction possible	Plan dependent but cannot exceed 20 years of contributions	Plan dependent	In a hybrid setting, a positive interest rate based on the government rate is guaranteed	N/A
Tax-Qualified Pension Plans (TQPPs) *** in abolition	Plan dependent	- Tax-deductible employer contributions until 2012 - Special asset tax may apply	Annuity benefit only	N/A	No clear rules	No clear rules	No clear rules	None	No clear target
National Pension Funds (NPFs)	65	Tax-exempt individual contributions up to the contribution limit	- Hybridity present - Benefits purchased and received as annuity lots	No	Immediate vesting implied	None	None	N/A	N/A
Corporate DC									
Corporate DC Schemes	60	- Tax-deductible contributions - Benefits and investment income taxed at withdrawal	- Annuity benefit - Lump sum allowed for account balance below JPY 15,000 - Can include disability, survivor and other benefits	No	- Employer contributions vesting is plan dependent, normally 3 years - Employee contributions are vested fully and immediately	10 years of contributions	Varies with retirement age	Guaranteed principal depending on choice of investment strategy	N/A
Individual DC									
Individual DC Schemes	60	- Tax-deductible contributions - Benefits and investment income taxed at withdrawal	- Annuity benefit - Lump sum allowed for account balance below JPY 500,000 or less than 3 years of contributions - Can include disability, survivor and other benefits	No	All contributions are vested fully and immediately	10 years of contributions	Varies with retirement age	Guaranteed principal depending on choice of investment strategy	N/A

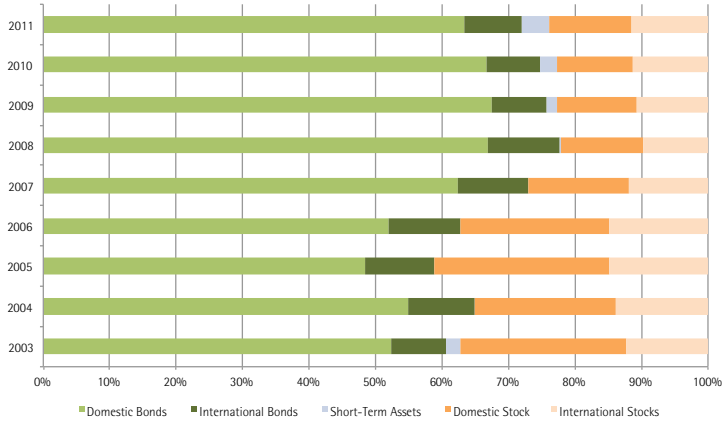
7. Appendix: Japan

Figure 47: State Subsidy for the National and Employee Pension



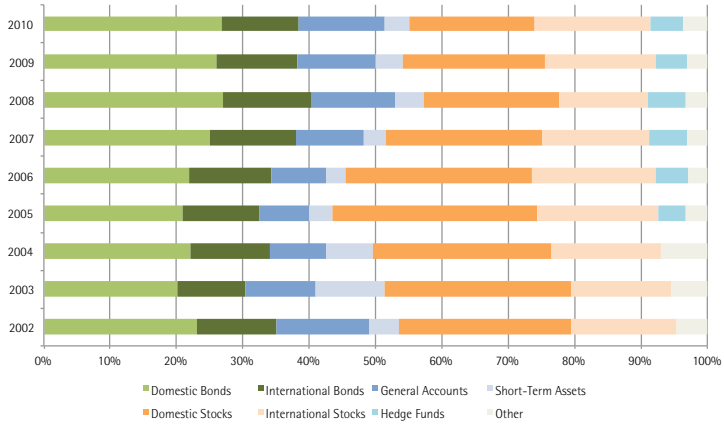
Source: Ministry of Health, Labour & Welfare (2009)

Figure 48: Evolution of the Asset Allocation of the GPIF



Source: Annual reports

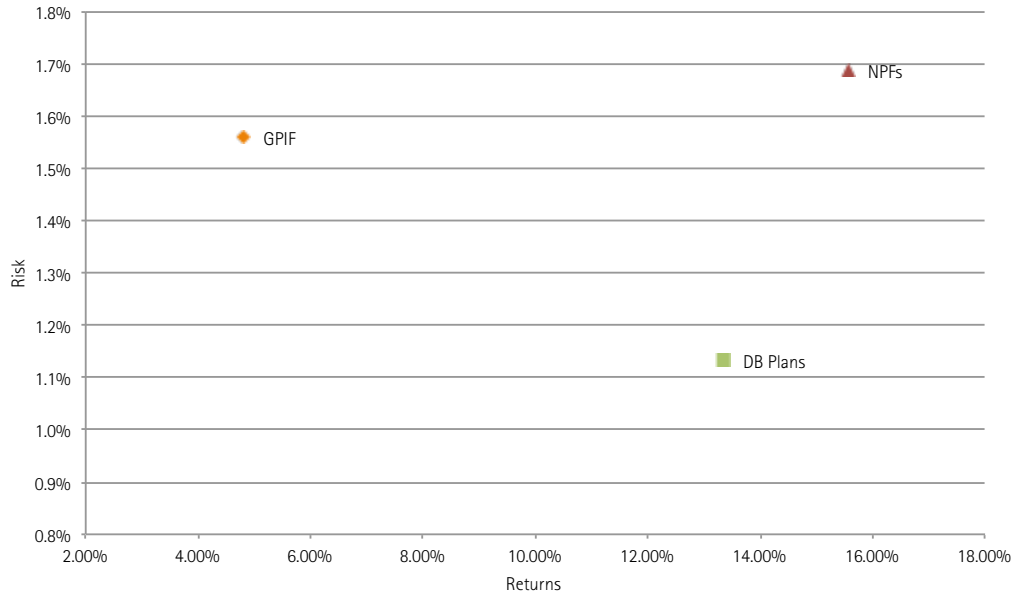
Figure 49: Evolution of the Asset Allocation of Corporate DB plans in Japan



Source: PFA

7. Appendix: Japan

Figure 50: Average returns and volatility of Japanese pensions, 2002-2010



Source: Annual reports

8. Appendix: Korea

8. Appendix: Korea

Table 26: Funded Pension Schemes in Korea

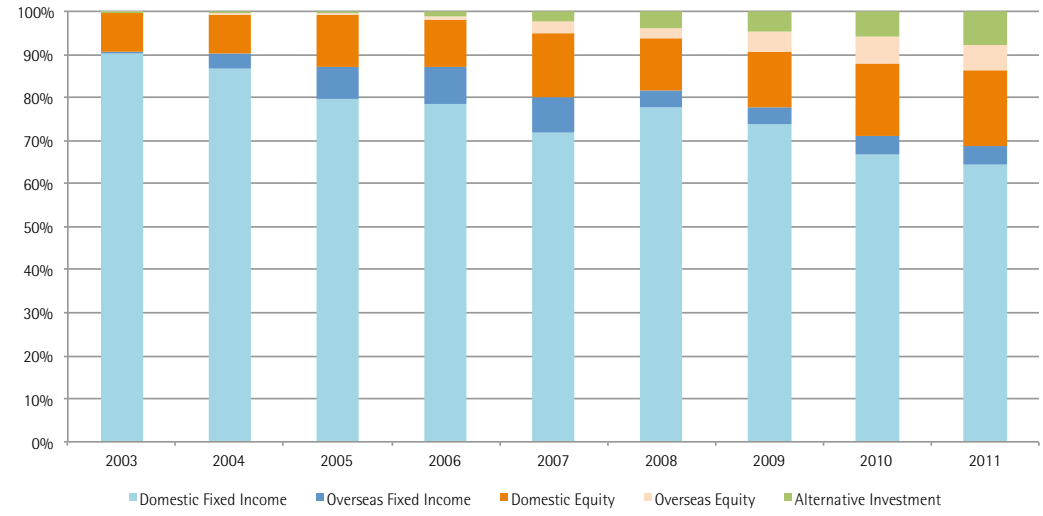
Country and Type	Established	Brief Description	Management	Mandatory	Eligibility	AUM (billion lcu)	%GDP	AUM (billion USD)	AUM (billion EUR)	AUM as of
Reserves						356,100	29%	321	248	
National Pension Fund (NPF)	1988	Reserve-backed PAYG plan for private sector	Public	Yes	Employed and self-employed workers (unemployed contribute voluntarily)	342,000	28%	308	238	2011
Government Employees Pension System (GEPS)	1960	Reserve-backed PAYG plan for public sector	Public	Yes	Government employees and public school teachers	4,600	0%	4	3	2011
Korean Teachers Pension Fund (KTPF)	1975	Reserve-backed PAYG plan for private school teachers	Public	Yes	Private school teachers	9,500	1%	9	7	2011
Corporate DB						26,500	2%	24	18	
Corporate DB Plans	2005	- Partially funded corporate DB pension plans - Set up as contracts with financial service providers	Private	Yes	Employees at workplaces with at least 5 staff	26,500	2%	24	18	2011
Corporate DC						6,600	1%	6	5	
Corporate DC Plans	2005	- Fully funded corporate DC pension plans - Set up as contracts with financial service providers	Private	Yes	Employees at workplaces with at least 5 staff	6,600	1%	6	5	2011
Individual DC						3,600	0%	3	3	
Individual Retirement Accounts (IRAs)	2005	- Fully funded DC pension plans available to retirees in the post-retirement stage, or employees in the accumulation stage - Set up as contracts with financial service providers	Private	No	Self-employed, unemployed and retired individuals	3,600	0%	3	3	2011
Individual Retirement Pensions (IRPs)	2011	- Fully funded DC pension plans available to retirees in the post-retirement stage, or employees in the accumulation stage - Retirees and those changing jobs are obliged to set up an IRP and move their assets from corporate plans - Set up as contracts with financial service providers	Private	Yes	Self-employed, unemployed and retired individuals	Recently introduced	Recently introduced	Recently introduced	Recently introduced	N/A

8. Appendix: Korea

Table 27: Funded Pension Schemes Paramaters

Scheme	Participants (th)	as of	Beneficiaries (th)	as of	Eligibility	% of Empl. Population	Employer Contribution	Employee Contribution	Contribution Limits
Reserves									
National Pension Fund (NPF)	19,000	2011	12,000	2011	Employed and self-employed workers (unemployed contribute voluntarily)	78%	4.50%	4.50%	Pensionable income cannot exceed 120% of average earnings
Government Employees Pension System (GEPS)	1,050	2009	290	2009	Government employees and public school teachers	4%	7.00%	7.00%	Dependent on pensionable income
Korean Teachers Pension Fund (KTPF)	260	2009	30	2009	Private school teachers	1%	7.00% from government and employer	7.00%	Dependent on pensionable income
Corporate DB									
Corporate DB Plans	3,300	2011	N/A	N/A	Employees at workplaces with at least 5 staff	14%	Plan dependent	Allowed	Max KRW 18 million per year
Corporate DC									
Corporate DC Plans	3,300	2011	N/A	N/A	Employees at workplaces with at least 5 staff	14%	8.30%	Allowed	Max KRW 18 million per year
Individual DC									
Individual Retirement Accounts (IRAs)	3,300	2011	N/A	N/A	Self-employed, unemployed and retired individuals	14%	Plan dependent	Plan dependent	No employee co-contribution if employer-sponsored
Individual Retirement Pensions (IRPs)	80	2011	N/A	N/A	Self-employed, unemployed and retired individuals	0%	Plan dependent	Plan dependent	Employed individuals can contribute max KRW 12 million per year

Figure 51: Asset Allocation of the NPF



Source: National Pension Fund (2011)

Table 28: DB Schemes Parameters

Scheme	Ret. Age	Taxation	Benefit Composition	Premature Withdrawal	Vesting or Accrual Rules	Full Benefit Eligibility	Minimum Benefit Eligibility	Indexation and Guarantees	Target Repl. Rate
Reserves									
National Pension Fund (NPF)	60	- Tax-exempt contributions - Benefits taxed at withdrawal	- Basic minimum benefit plus earning-related benefit paid as monthly pension - Lump sums possible only if member becomes public employee or has less than 10 years of contributions - Includes disability and survivor benefit	No	Accrual of 0.75% of average salary per year of contributions	- 60 years of age - 20 years of contributions	- 55 years of age - 10 years of contributions	- Inflation indexation - Guaranteed interest in case of lump sum	50%
Government Employees Pension System (GEPS)	65	- Tax-exempt contributions - Benefits taxed at withdrawal	- Lump sum if less than 20 years - Annuity benefit possible if more than 20 years of contributions - Includes survivor benefits and an additional retirement allowance	No	- Accrual of 1.90% of average salary per year of service - Progressive accrual rate for the additional retirement allowance	33 years of service	20 years of service	Inflation indexation	65%
Korean Teachers Pension Fund (KTPF)	65	- Tax-exempt contributions - Benefits taxed at withdrawal	- Lump sum if less than 20 years contributions - Annuity benefit possible if more than 20 years of contributions - Includes disability, survivor, medical, disaster benefits and loans to members	No	Progressive accrual rate averaging to 1.90% of average salary per year of service	33 years of service	1 year of service	- Inflation indexation above the annual inflation rate - Wage indexation	76%
Corporate DB									
Corporate DB Plans	55	- Preferrential taxation up to KRW 12 million - Preferrential taxation for annuity benefits	- Annuity benefit for 5 years - Lump sum possible, especially when changing jobs - Should not be less than one month's average salary per year of service - Hybridity possible in combination with DC plan	No	Accrual of one monthly salary based on average final wage per year of service	10 years of contributions	None	Wage indexation	N/A

8. Appendix: Korea

Table 29: DC Scheme Parameters

Scheme	Ret Age	Taxation	Benefit Composition	Premature Withdrawal	Vesting or Accrual Rules	Full Benefit Eligibility	Minimum Benefit Eligibility	Indexation and Guarantees
Corporate DC								
Corporate DC Plans	55	- Preferential taxation up to KRW 12 million - Preferential taxation for annuity benefits	- Annuity benefit for 5 years - Lump sum possible, especially when changing jobs - Should not be less than one month's averag salary per year of service - Hybridity possible in combination with DB plan	Upon long-term illness or purchase of first residence	Immediate vesting implied	10 years of contributions	None	- Wage indexation - Guaranteed principal or interest rate depending on choice of product
Individual DC								
Individual Retirement Accounts (IRAs)	55	- Tax-deductible contributions up to KRW 4 million per year across plans - Tax-exempt benefits up to KRW 6 million per year - Preferential taxation for annuity benefits	- Annuity benefit for 5 years - Lump sum possible	Upon long-term illness or purchase of first residence	Immediate vesting implied	10 years of contributions	None	Guaranteed principal or interest rate depending on choice of product
Individual Retirement Pensions (IRPs)	55	- Tax-deductible contributions up to KRW 4 million per year across plans - Tax-exempt benefits up to KRW 6 million per year - Preferential taxation for annuity benefits	- Annuity benefit for 5 years - Lump sum possible	Upon long-term illness or purchase of first residence	Immediate vesting implied	10 years of contributions	None	Guaranteed principal or interest rate depending on choice of product

8. Appendix: Korea

Table 30: Main corporate pension providers, 2011

Service Provider	Pension Assets (KRW bn)	One-Year Change
Samsung Life	7,416	64%
Shinhan Bank	4,449	67%
Kookmin Bank	4,439	56%
Woori Bank	4,031	69%
IBK	3,023	76%
HMC Investment Securities	2,760	119%
Hana Bank	2,217	71%
Kyobo Life	2,188	66%
Nonghyup	1,841	53%
KDB	1,797	103%
Samsung Fire	1,637	50%
Mirae Asset Securities	1,630	57%
Korea Life	1,378	97%
KEB	1,141	76%
LIG Insurance	1,020	59%
Samsung Securities	884	75%
Hi Investment Securities	869	2066%
Korea Investment Securities	719	70%
Morae Asset Life	653	75%
Lotte Inurance	456	147%

Source: Towers Watson (2012b)

Table 31: Corporate Pension Investment Restrictions

DB	DC
Listed domestic and international stocks may not exceed 30%.	Individual stocks, equity funds and balanced funds are not permitted.
International bond funds may not exceed 50%.	Deposit accounts, principal-guaranteed insurance products, and some other investment products are allowed.
Balanced funds must be 50% or less.	Maximum equity exposure cannot exceed 40%.
Equity funds must be under 50%.	

Source: Nomura (2010)

Table 32: NPF Investment Policy by Asset Class

NPF Investment Policy by Asset Class
The bond portfolio aims to achieve stable long-term performance and is mostly buy-and-hold. Diversification is secured across bond types and maturity horizons, and alpha is targeted via adjustments in portfolio duration.
The domestic equity portfolio maintains a long-term horizon but aims to maximise returns within a certain level of risk. Internal equity management is mostly done passively and comprises shares of the investable universe. The proportion of internally managed funds is roughly equal to that managed externally.
Under external mandates, active management is emphasised and diverse investment strategies and styles are preferred. When it comes to international investing, it aims to enhance existing positions, which means an increase in returns at similar levels of risk as those in the domestic market, or the same performance at lower levels of risk.
Alternative investments are geared towards excess performance. The universe includes real estate, social infrastructure, venture capital, corporate restructuring and private equity.

Source: National Pension Fund (2011)

9. Appendix: Taiwan

9. Appendix: Taiwan

Table 33: Funded Pension Schemes in Taiwan

Scheme	Est.	Brief Description	Management	Mandatory	Eligibility	AUM (lcu bn)	% GDP	AUM (USD bn)	(AUM EUR bn)	as of
Reserves						1,790	13%	60	47	
National Pension Insurance Fund (NPIF)	2008	- Reserve-backed PAYG system for uninsured individuals - Managed by the Bureau of Labour Insurance (BLI)	Public	No	Unemployed, housewives and others aged 25-65 and not covered by other systems	100	1%	3	3	2011
Labour Insurance Fund (LIF)	1950	- Reserve-backed PAYG system for private sector - Managed by the Bureau of Labour Insurance (BLI)	Public	Yes	Employees at companies with at least 5 staff, self-employed workers, civil servants, private teachers and fishermen	450	3%	15	12	2011
Labour Retirement Fund (LRF) *** closed to new members since 2005	1984	- Reserve-backed supplementary PAYG system for private sector - Replaced by Labour Pension Fund (LPF) - Managed by the Bureau of Labour Insurance (BLI)	Public	No	Employed workers	560	4%	19	15	2011
Government Employee & School Staff Insurance (GESSI)	1958	- Reserve-backed PAYG system for public sector - Managed by Bank of Taiwan (BOT)	Public	Yes	Civil workers, public and private teachers	180	1%	6	5	2011
Public Service Pension Fund (PSPF)	1995	Reserve-backed supplementary PAYG system for public sector	Public	Yes	Civil workers, public teachers, military personnel	500	4%	17	13	2011
Public DC						750	5%	25	19	
Private Teachers Pension Fund (PTPF)	2010	Individual retirement savings accounts for private school teachers	Private	Yes	Private school teachers	7	0%	0	0	2011
Labour Pension Fund (LPF)	2005	- Fully funded supplementary DC plans for private sector - Managed collectively by the Bureau of Labour Insurance (BLI)	Public	Yes	Employed workers except private teachers	750	5%	25	19	2011

9. Appendix: Taiwan

Table 34: Funded Pension Schemes Paramaters

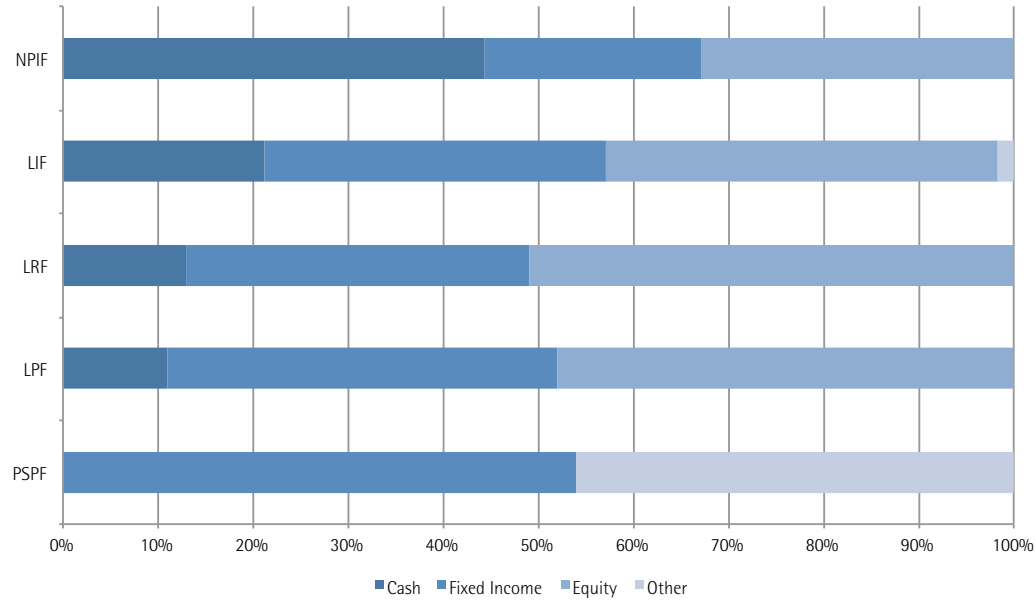
Scheme	Participants (th)	as of	Beneficiaries (th)	as of	Eligibility	% of Empl. Population	Employer Contribution	Employee Contribution	Contribution Limits
Reserves									
National Pension Insurance Fund (NPIF)	3,800	2011	1,200	2011	Unemployed, housewives and others aged 25-65 and not covered by other systems	20%	None	7.50% from government and employee	Dependent on pensionable base of TWD 17,280 per month
Labour Insurance Fund (LIF)	9,700	2011	190	2011	Employees at companies with at least 5 staff, self-employed workers, civil servants, private teachers and fishermen	90%	5.25% from employer and 0.75% from government	2%	Dependent on pensionable income of max TWD 43,900 per month
Labour Retirement Fund (LRF) *** closed to new members since 2005	3,400	2011	440	2011	Employed workers	32%	Plan dependent, min 2,00%	None	15% of salaries
Government Employee & School Staff Insurance (GESSI)	630	2011	N/A	N/A	Civil workers, public and private teachers	6%	5%	3%	A maximum of coverage years applies
Public Service Pension Fund (PSPF)	630	2011	210	2011	Civil workers, public teachers, military personnel	6%	9.70% from government	5%	Contributions are calculated based on twice the basic pay
Public DC									
Private Teachers Pension Fund (PTPF)	67	2011	N/A	N/A	Private school teachers	1%	7.80% from employer and government	4%	Contributions are calculated based on twice the basic pay
Labour Pension Fund (LPF)	5,500	2011	155	2011	Employed workers except private teachers	51%	6%	Allowed	Employee contributions cannot exceed 6%

Table 35: Funded Pension Schemes Parameters (continued)

Scheme	Ret. Age	Taxation	Benefit Composition	Premature Withdrawal	Vesting or Accrual Rules	Full Benefit Eligibility	Minimum Benefit Eligibility	Indexation and Guarantees	Target Repl. Rate
Reserves									
National Pension Insurance Fund (NPIF)	65	- Employee contributions deductible up to TWD 24,000 per year - Lump sum benefit deductible up to TWD 150,000 - Monthly benefits deductible up to TWD 650,000 per year	- Monthly benefit only - Includes disability, maternity, death and survivor benefits - Means tested	No	Accrual of 1.3% of pensionable base per year of coverage	N/A	N/A	Inflation and wage indexation	N/A
Labour Insurance Fund (LIF)	60	- Employee contributions deductible up to TWD 24,000 per year - Lump sum benefit deductible up to TWD 150,000 - Monthly benefits deductible up to TWD 650,000 per year	- Annual benefit - Lump sum with reduction possible with less than 15 years of contributions - Includes injury, old age, medical care, disability, survivor and maternity benefits	No	Accrual of 1.55% of highest average monthly pensionable salary per coverage year	15 years of contributions	1 year of contributions	Inflation indexation	N/A
Labour Retirement Fund (LRF) *** closed to new members since 2005	55	- Employee contributions deductible up to TWD 24,000 per year - Lump sum benefit deductible up to TWD 150,000 - Monthly benefits deductible up to TWD 650,000 per year	Lump sum only	No	- Accrual of 2 end average salaries up to 15 years and 1 end average salary thereafter - 15 years service and seniority	25 years at same employer	15 years at same employer	Guaranteed interest rate	N/A
Government Employee & School Staff Insurance (GESSI)	55	- Employee contributions deductible up to TWD 24,000 per year - Lump sum benefit deductible up to TWD 150,000 - Monthly benefits deductible up to TWD 650,000 per year	- Monthly benefit - Lump sum possible with less than 30 years of service - Includes disability, death and parental leave benefits	No	Accrual of 3 basic salaries for each year of service	30 years of service	15 years of contributions	N/A	N/A
Public Service Pension Fund (PSPF)	60	- Employee contributions deductible up to TWD 24,000 per year - Lump sum benefit deductible up to TWD 150,000 - Monthly benefits deductible up to TWD 650,000 per year	- Monthly benefit after 50 years of age - 4% of basic salary for each year in service is paid monthly - Lump sum with reduction otherwise - Includes survivor benefit and severance pay	No	- Accrual of 4 basic salaries for each year of service	Age and years in service should sum to 85	5 years of service	Guaranteed interest rate	95%
Public DC									
Private Teachers Pension Fund (PTPF)	65	- Employee contributions deductible up to TWD 24,000 per year - Lump sum benefit deductible up to TWD 150,000 - Monthly benefits deductible up to TWD 650,000 per year	- Monthly benefit possible after 15 years of contributions - Lump sum	No	N/A	25 years of service	10 years of service	N/A	N/A
Labour Pension Fund (LPF)	60	- Employee contributions deductible up to TWD 24,000 per year - Lump sum benefit deductible up to TWD 150,000 - Monthly benefits deductible up to TWD 650,000 per year	- Monthly benefit - Lump sum possible for members enrolled before 2009 - Includes survivor benefits	No	Immediate full vesting	None	None	Guaranteed interest rate	N/A

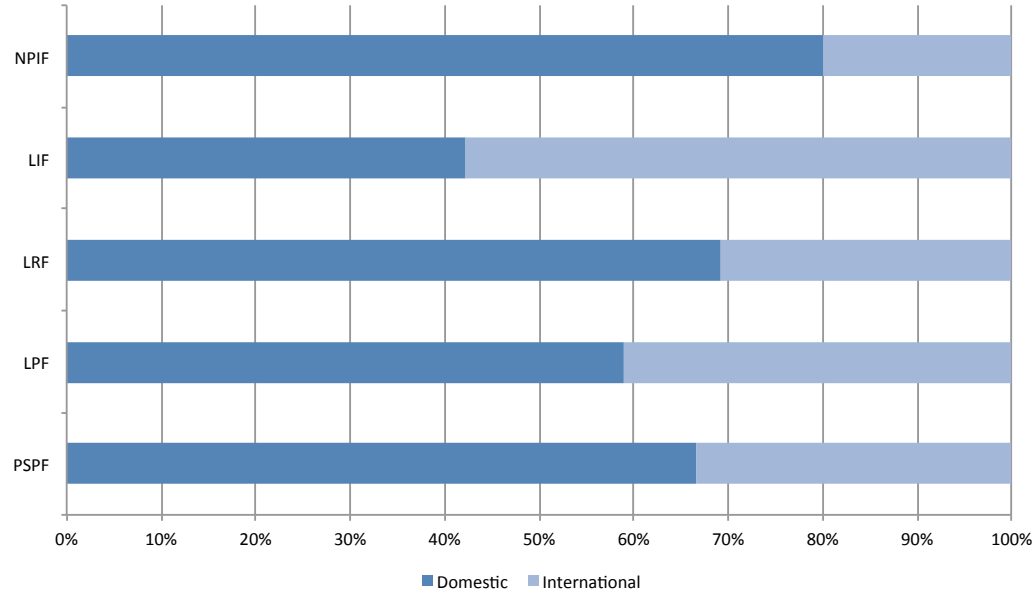
9. Appendix: Taiwan

Figure 52: Taiwanese Pension Funds Asset Allocations



Source: Annual Reports

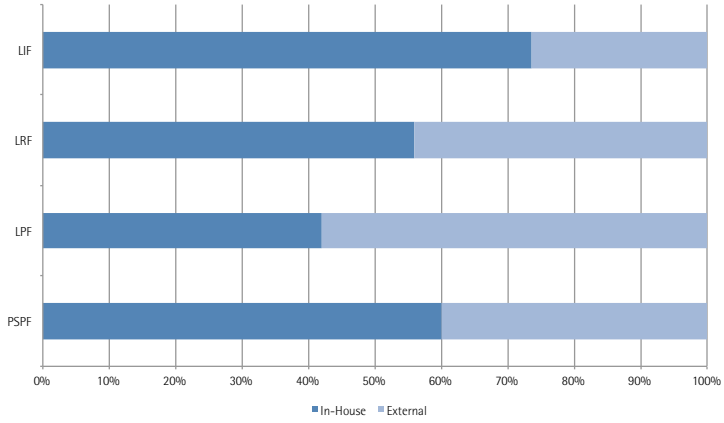
Figure 53: Taiwanese Pension Funds Asset Allocationby Geography



Source: Annual Reports

9. Appendix: Taiwan

Figure 54: Taiwanese Pension Funds Allocation to External Mandates



Source: Annual Reports

Table 36: Self-Imposed Asset Allocation Restrictions at Taiwanese Pension Funds, 2011

Asset Class	LPF	LRF
Bank Deposit	10-30%	15-35%
Domestic Debt Securities	12-26%	13-30%
Domestic Equity Securities	22-38%	25-40%
Foreign Debt Securities	12-20%	7-15%
Foreign Equity Securities	14-25%	7-20%

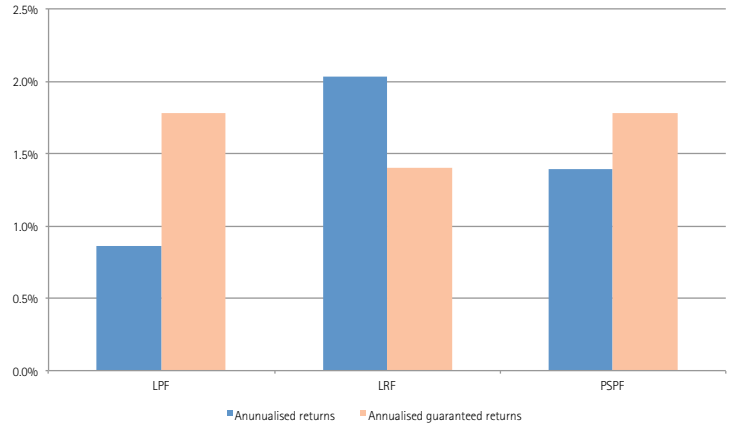
Source: Official websites and annual reports

Figure 55: Percentage points difference between guaranteed and actual rate of return at Taiwanese pension funds

Source: Annual reports

9. Appendix: Taiwan

Figure 56: Guaranteed and actual rates of return at Taiwanese pension funds, 2005-2011



Source: Annual reports

9. Appendix: Taiwan

10. Appendix: Mainland China

10. Appendix: Mainland China

Table 37: Funded Pension Schemes in China

Scheme	Est.	Brief Description	Management	Mandatory	Eligibility	AUM (lcu bn)	% GDP	AUM (USD bn)	AUM (EUR bn)	as of
Reserves						2,420	6%	389	301	
National Social Security Fund (NSSF)	2000	- Reserve fund managed by the National Council for Social Security Fund (NCSSF) - Not financed directly from pension contributions	Public	N/A	N/A	870	2%	140	108	2011
Urban Social Insurance (USI)	1997	Public pension reserves accumulated independently in each province and backing PAYG plans	Public	Yes	Urban workers	1,550	4%	249	193	2010
Public DC						240	1%	39	30	
Urban Social Insurance Individual Accounts (USI IAs)	1997	- Fully funded quasi-DC plans supplementing provincial reserves - Many USI IAs are notional in nature	Public	Yes	Urban workers	200	1%	32	25	2010
Rural Social Insurance Individual Accounts (RSI IAs)	2008	Fully funded quasi-DC plans supplementing provincial reserves	Public	No	Rural workers above the age of 16 who are not students	40	0%	6	5	2010
Corporate DC						280	1%	45	35	
Enterprise Annuities (EAs)	2004	Fully funded corporate DC plans set up as contracts with financial service providers	Private	No	Urban workers	280	1%	45	35	2010

10. Appendix: Mainland China

Table 38: Funded Pension Schemes Paramaters

Scheme	Participants (th)	as of	Beneficiaries (th)	as of	Eligibility	% of Empl. Population	Employer Contribution	Employee Contribution	Contribution Limits
Reserves									
Urban Social Insurance (USI)	194,000	2010	63,000	2010	Urban workers	25%	Plan dependent, 20.00% on average	None	Employer contribution max 300% of average provincial salary including contributions to USI
Public DC									
Urban Social Insurance Individual Accounts (USI IAs)	see USI	2010	see USI	2010	Urban workers	see USI	None	Plan dependent, 8.00% on average	Employer contribution max 300% of average provincial salary including contributions to USI
Rural Social Insurance Individual Accounts (RSI IAs)	103,000	2010	29,000	2010	Rural workers above the age of 16 who are not students	13%	From government, plan dependent, min RMB 30 per year	Plan dependent, RMB 100-500 per year	RMB 500 per year
Corporate DC									
Enterprise Annuities (EAs)	13,400	2010	N/A	N/A	Urban workers	2%	Plan dependent	Not required and not always allowed	Max 8.33% of annual wages or 12.50% of salaries

10. Appendix: Mainland China

Table 39: Funded Pension Schemes Parameters (continued)

Country and Type	Ret. Age	Taxation	Benefit Composition	Premature Withdrawal	Vesting or Accrual Rules	Full Benefit Eligibility	Minimum Benefit Eligibility	Indexation and Guarantees	Target Repl. Rate
Reserves									
Urban Social Insurance (USI)	60 for men, 55 for women	- Tax-deductible contributions - Benefits and investment income taxed at withdrawal	- Basic monthly benefit - Monthly pension paid as annuity benefit - Lump sum if less than 15 years of contributions	No	- According to benefit formula - Plan dependent	15 years of contributions	None	- Indexation above inflation and below wage increase	Plan dependent, 20% on average
Public DC									
Urban Social Insurance Individual Accounts (USI IAs)	60 for men, 55 for women	- Tax-deductible contributions - Benefits and investment income taxed at withdrawal	- Monthly pension paid as annuity benefit - Lump sum if less than 15 years of contributions	No	Contributions are credited but accumulated funds were used up for USI	15 years of contributions	None	None	Plan dependent, 38% on average
Rural Social Insurance Individual Accounts (RSI IAs)	60	- Tax-deductible contributions - Benefits and investment income taxed at withdrawal	- Basic monthly benefit of min RMB 55 from government revenue - Additional monthly pension paid as annuity benefit - Lump sum possible if less than 15 years of	No	Plan dependent	15 years of contributions	- 60 years of age - Offspring must participate	- Guaranteed min benefit - Guaranteed appreciation according to 1-year bank deposit	15%
Corporate DC									
Enterprise Annuities (EAs)	60 for men, 55 for women	- Tax-deductible employer contributions up to 5% - Fully taxed employee contributions	- Lump sum - Annuity benefit	No	- Plan dependent - Full vesting commonly after 5 years - Full immediate vesting of employee contributions if any	Plan dependent	None	None	Plan dependent

10. Appendix: Mainland China

Table 40: Key regulations of the Chinese pension fund sector

Year	Document	Publisher	Title	Comments
1991	Circular No. 33	State Council	State Council Decision on Reform of Enterprises Employee's Pension System	Recommendations to build a three-pillar system comprised of pools and individual accounts with contributions from employers and employees
1995	Circular No. 6	State Council	State Council Notice on Further Reform of Enterprise Employees' Pension System	Increase of social insurance contribution rates
1997	Circular No. 26	State Council	State Council Decision on Unified Basic Pension System for Enterprise Employees	Broad principles for setting up provincial pension funds following the 1997 recommendations of the World Bank
2000	Circular No. 42	State Council	State Council Notice on Pilot Project for Consummation of Social Security System	The Liaoning and other similar pilots dealing with separation and full funding of individual account assets, simplification of the contributions structure, and tax stimulus and investment outsourcing for enterprise annuities
2001		MOF & MOLSS	Preliminary Rules on the Administration of Investments of the National Social Security Fund	Initial investment restrictions for the NSSF
2004	MOLSS Document 20	MOLSS	Temporary Regulation on Enterprise Annuity	Institutionalisation of supplementary workplace pension provision
2004	MOLSS Document 23	MOLSS	Temporary Regulation of Fund Management on Restrictions on EA equity investments	
2005	Circular No. 38	State Council	State Council Decision on Improve Enterprise Worker Basic Pension System	Additional provisions on contribution rates, full funding for individual accounts and eligibility criteria for retirement income streams
2006		MOF,MOLSS & PBOC	Preliminary Rules on the Management of Overseas Investments of the National Social Security Fund	Relaxation of restrictions on NSSF assets
2011	MOHRSS Document 11	MOHRSS, CBRC, CSRC & CIRC	Regulation of Fund Management in Enterprise Annuities	Relaxation of restrictions on EA equity investments

Footnotes:
CBRC: China Banking Regulatory Commission
CIRC: China Insurance Regulatory Commission
CSRC: China Securities Regulatory Commission
MOHRSS: Ministry of Human Resources & Social Security
MOF: Ministry of Finance
MOLSS: Ministry of Labor & Social Security
PBOC: People's Bank of China

Source: Agarwala (1997); Hu (2006); Piggott and Bei (2007); Oksanen (2010); Leckie et al. (2005)

10. Appendix: Mainland China

Table 41: NSSF Mandates

Year	Mandate	Benchmark	Target Net-of-Fees Excess Return p.a.	Tracking Error p.a.	Managers
2008	Active Global (ex-US) Equities	MSCI World (ex US)	200 bps	Within 8%	AXA Rosenberg Alliance Bernstein State Street Global Advisor
	Inde Inhanced US Equities	S&P 500	50 bps	Within 2%	Janus INTECH T.Rowe Price
	Active Hong Kong Equities	FTSE China Hong Kong	300 bps	Within 8%	Allianz UBS INVESCO
	Active Global Fixed Income	Barclays Capital Global Aggregate Bond	100 bps	Within 2%	Black Rock PIMCO Alliance Bernstein
	Cash	6-month LIBOR	0 bps	N/A	Black Rock
2009	Active China Overseas Equities	MSCI China Index	N/A	N/A	Schroders Bosera Baring
	Active APAC (ex Japan) Equities	MSCI AC Asia Pacific ex Japan	N/A	N/A	Martin Currie JF/JP Morgan Principal
	Active Emerging Marker Equity	MSCI Emerging Market	N/A	N/A	Batterymarch Morgan Stanley Schroders
	Active European Equities	MSCI Europe	N/A	N/A	Newton Fidelity
	Active Global Equities	MSCI World	N/A	N/A	Prudential (UK) Wellington
2012	Multi-Asset-Class	N/A	N/A	N/A	JP Morgan Lombard Odier Neuberger Berman Schroders
	Emerging Markets (ex China) Lcoal Currency Debt	JP Morgan Global Emerging Market Diversified Debt	N/A	N/A	Standish Stone Harbor
	Natural Resources Equities	50% MSCI AC World Energy + 50% MSCI AC World Metals & Mining	N/A	N/A	AGF Investec JP Morgan RBC GAM
	Global Real Estate Equities	FTSE EPRA/NAREIT Developed	N/A	N/A	AEW AMP Capital European Investors

Source: Annual reports, official websites

Table 42: NSSF Private Equity Mandates

Fund Name	Fund Manager
China-Belgium Direct Equity Investment Fund	Haitong-FortisPrivate Equity Fund
Bohai Industrial Investment Fund	Bohai Industrial IMC
Hony Capital Industrial Investment Fund 1	Hony Capital (LP)
CDH Investments Private Equity Fund 1	CDH Investments
Mianyang Science and Technology City Industrial Investment Fund	CITIC Private Equity
Legend Ruizhi Ventrue Capital	Legend Capital
IDG Growth Investment	IDG Capital Partners
Hony Capital 2010 Private Equity	Hony Capital (LP)
CDH Investment Private Equity (LP)	CDH Investments
China Broadband Capital Private Equity (LP)	Chian Broadband Capital
Legend Ruiqi Private Equity (LP)	Legend Capital
CITIC Captial Private Equity (LP)	CITIC Captial (LP)
Shanghai Finacial Sector Investment Fund (LP)	GP Capital

Source: Annual reports, official websites

10. Appendix: Mainland China

Table 43: Entreprise Annuities Licence Requirements

	Trustee	Administrator	Custodian	Investment Manager	
Requirements for Registered Capital & net assets at all time	RMB 500 mn	RMB 500 mn	RMB 5 bn	Securities Pension MC Trust FMC, IAMC, SAMC and others	RMB 1 bn RMB 500 mn RMB 300 mn RMB 100 mn
Other Requirements	Register and obtain the approval of a Chinese financial regulatory authority Maintain sound corporate governance and structure Staff a required number of specialists holding EA professional certificates				
Fee p.a.	Up to 0.2% of EA net value	Up to RMB 5 per month per account	Up to 0.2% of EA net value	Up to 1.2% of EA net value (1/5 of the 1.2% must be allocated to a risk reserve until it reaches 10% of EA net value	

Source: Leckie and Xiao (2012)

Table 44: Entreprise Annuities Licence Holders

Company	Trustee	Administrator	Cusotdian	Investment Manager
ICBC	●	●	●	●
China Construction Bank	●	●	●	○
China Merchants Bank	●	●	●	○
Ping An PIC	●	●	○	●
Tai Ping PIC	●	○	○	●
China Life PIC	●	●	○	●
Changjiang PIC	●	●	○	●
Taikang PIC	●	●	○	●
CITIC Trust	●	●	●	●

Source: Leckie and Xiao (2012)

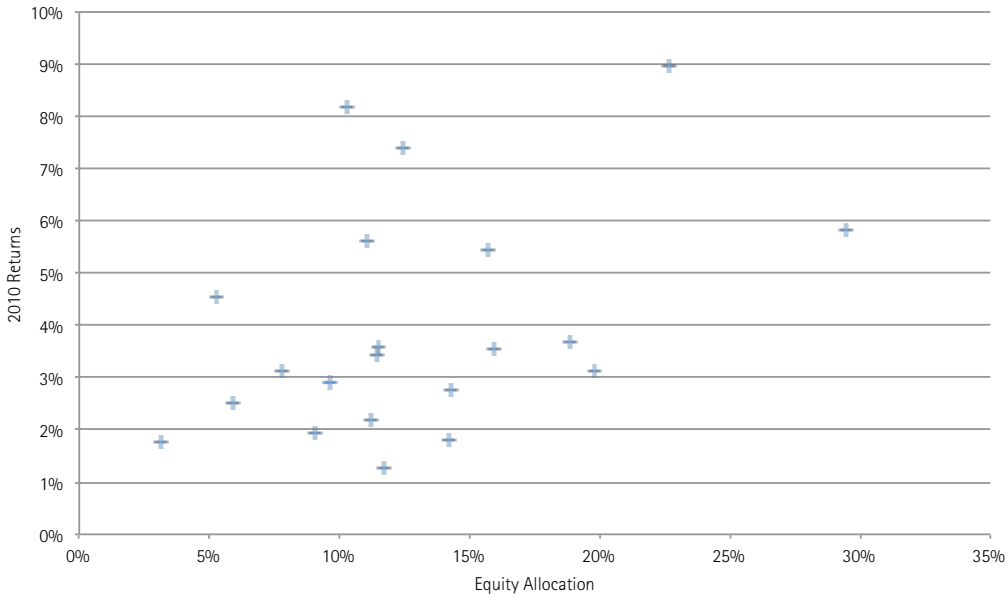
Table 45: Entreprise Annuities Managers

License Date	FMC Name	Established	Foreign Partner
2005	Bosera Funds	1998	
	HFT Investment	2003	BNP Paribas
	China AMC	1998	Power Corporation of Canada
	Harvest Fund	1999	Deutsche Bank
	E Fund	2001	
	China Southern Fund	1998	
	Fullgoal Fund	1999	BMO Financial
	Yin Hua Fund	2001	
	CICC	1995	GIC, Texa Pacific Group, etc.
	CITIC Securities	1995	
	Huatai AMC	2005	ACE Group
	China Life PIC		
	Ping An PIC		
	Tai Ping PIC		
2007	Guotai AMC	1998	Generali
	ICBC Credit Suisse	2005	Credit Suisse
	GF Fund	2003	
	Taikang FMC		
	PICC FMC		
	Changjiang PIC		

Source: Leckie and Xiao (2012)

10. Appendix: Mainland China

Figure 57: Annual Returns of 21 Enterprises Annuity Managers, 2010



Source: Zheng (2011)

Figure 58: Asset Allocations of 21 Enterprises Annuity Managers, 2010

Source: Zheng (2011)

11. Appendix: Hong Kong

11. Appendix: Hong Kong

Table 46: Funded Pension Schemes in Hong Kong

Scheme	Est.	Brief Description	Management	Mandatory	Eligibility	AUM (lcu bn)	% GDP	AUM (USD bn)	AUM (EUR bn)	as of
Corporate DB						110	6%	14	11	
Occupational Retirement Schemes Ordinance (ORSO) DB Schemes	1993	- Fully funded corporate DB plans set up as contracts with financial service providers - Some are supervised by the Mandatory Provident Fund Schemes Authority (MPFA)	Private	No	Plan dependent	110	6%	14	11	2012
Occupational DC						390	21%	50	39	
Mandatory Provident Fund (MPF) Schemes	2000	- Fully funded occupational DC plans set up as contracts with financial service providers - Supervised by the Mandatory Provident Fund Schemes Authority (MPFA)	Private	Yes	Full-time employees and self-employed aged 18-65	390	21%	50	39	2012
Corporate DC						160	8%	21	16	
Occupational Retirement Schemes Ordinance (ORSO) DC Schemes	1993	- Fully funded corporate DC plans set up as contracts with financial service providers - Some are supervised by the Mandatory Provident Fund Schemes Authority (MPFA)	Private	No	Plan dependent	160	8%	21	16	2012

11. Appendix: Hong Kong

Table 47: Funded Pension Schemes Paramaters

Scheme	Participants (th)	as of	Eligibility	% of Empl. Population	Employer Contribution	Employee Contribution	Contribution Limits
Corporate DB							
Occupational Retirement Schemes Ordinance (ORSO) DB Schemes	140	2011	Plan dependent	4%	Plan dependent	Plan dependent	Plan dependent
Occupational DC							
Mandatory Provident Fund (MPF) Schemes	2,600	2011	Full-time employees and self-employed aged 18-65	73%	5.00%	5.00%	Dependent on max pensionable income of HKD 25,000
Corporate DC							
Occupational Retirement Schemes Ordinance (ORSO) DC Schemes	280	2011	Plan dependent	8%	Plan dependent	Plan dependent	Plan dependent

Table 48: Funded Pension Schemes Parameters (continued)

Scheme	Ret. Age	Taxation	Benefit Composition	Premature Withdrawal	Vesting or Accrual Rules	Full Benefit Eligibility	Minimum Benefit Eligibility	Indexation and Guarantees
Corporate DB								
Occupational Retirement Schemes Ordinance (ORSO) DB Schemes	Plan dependent	Tax-free contributions and benefits	- Lump sum - Hybridity possible in combination with DC plan	Upon redundancy	- Plan dependent - Gradual vesting after 3 years	Plan dependent	Plan dependent	Plan dependent
Occupational DC								
Mandatory Provident Fund (MPF) Schemes	65	- Tax-deductible employer contributions up to HKD 15,000 per year - Tax-deductible employee contributions up to HKD 15,000 per year - Tax-exempt benefits unless premature withdrawal	Lump sum only	Upon terminal illness or permanent departure from Hong Kong	All contributions are vested fully and immediately	None	None	None
Corporate DC								
Occupational Retirement Schemes Ordinance (ORSO) DC Schemes	Plan dependent	Tax deductible contributions	- Lump sum - Hybridity possible in combination with DB plan	Upon redundancy	- Plan dependent - Gradual vesting after 3 years	Plan dependent	Plan dependent	Plan dependent

11. Appendix: Hong Kong

Table 49: MPF Trustees

Name	Schemes	Options per Scheme
Ageas Trustees (HK) Ltd	1	3
American International Assurance Company (Trustee) Ltd	3	25
AXA China Region Trustees Ltd	2	10
Bank Consortium Trust Company Ltd	5	10-20
Bank of Communications Trustee Ltd	1	11
Bank of East Asia (Trustees) Ltd	2	12
BOCI-Prudential Trustee Ltd	2	11
China Life Trustees Ltd	1	9
HSBC Institutional Trust Services (Asia) Ltd	2	5-15
HSBC Provident Fund Trustee (Hong Kong) Ltd	9	3-15
InG Pension Trust Ltd	2	8
Manulife Provident Funds Trust Company Ltd	2	10-25
MassMutual Trustees Ltd	1	13
Principal Trust Company (Asia) Ltd	3	5-15
RBC Dexia Trust Services Hong Kong Ltd	3	5-25
Sun Life Trustee Company Ltd	1	13

Source: MPFA

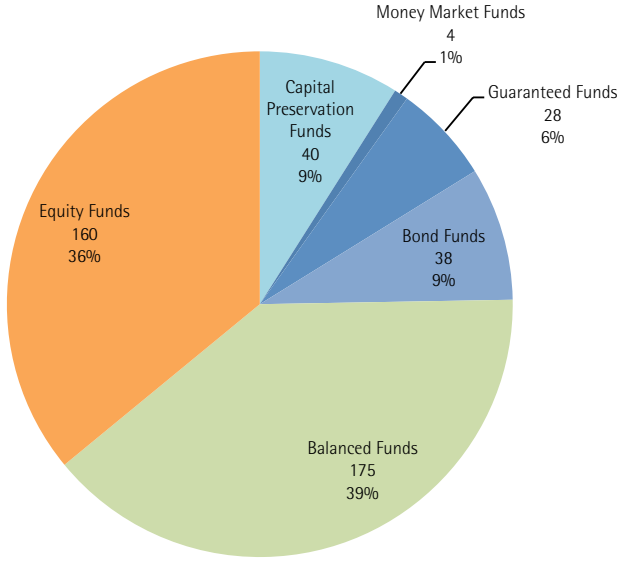
Table 50: Investment restrictions in HK pension funds

MPF Schemes	ORSO Schemes
Not allowed to lend more than 10% of fund assets at any given time and only if such activity will bring additional net income for participants without affecting their interests negatively.	Prohibited from lending pension assets to the employer or his associates.
Collateral provided to cover any lending should be more than the combined value of lent securities and must be marked to market on a daily basis.	A maximum of 10% of the assets may be allocated to the stock of the employer or his associates.
Lending to anonymous parties is not allowed.	Unlisted equity is not permitted.
Borrowing of securities is prohibited.	Scheme funding is required to cover the combined vested liability of all members.
Leveraging is restricted.	Shortfalls established through an actuarial valuation should be covered as agreed between the employer and the scheme administrator.
Investing in securities issues by any one party may not exceed 10% of total assets.	
Derivatives hedging, repos, stock investing, investment-grade debt securities, convertible bonds and listed warrants are allowed, but limited.	
Bond funds may not have more than 30% invested in a single government issue but can be fully invested in government debt.	
Equity investments must be fully paid-up listed shares and no more than 10% can be invested via non-MPFA-approved exchanges.	
No more than 5% can be allocated to warrants.	
No more than 10% can be placed in a deposit with a single bank.	
Commodities, direct property, loans, mortgages, jewellery, art and collectibles are not allowed.	
Foreign currency exposure may not exceed 70%.	
Investment in own stock is limited to 10%.	

Source: MPFA

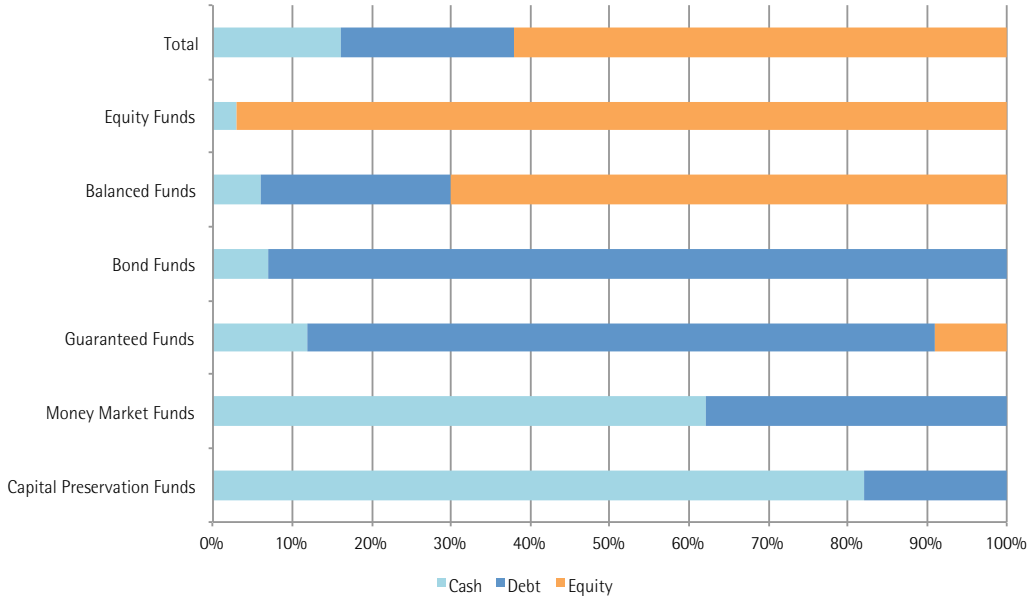
11. Appendix: Hong Kong

Figure 59: MPF Constituent funds by category, 2011



Source: MPFA

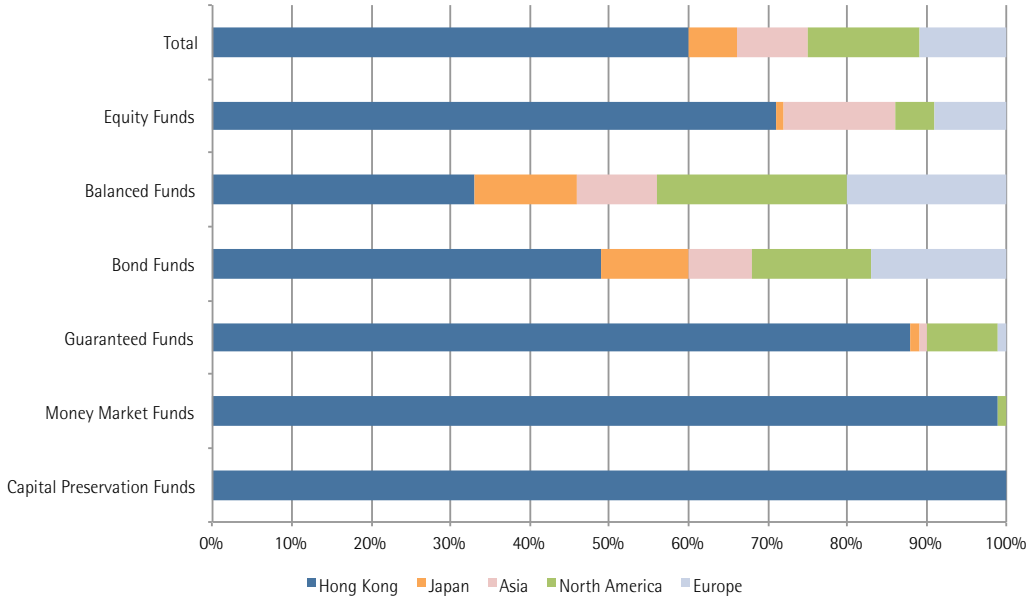
Figure 60: MPF Constituent funds asset allocations, 2011



Source: MPFA

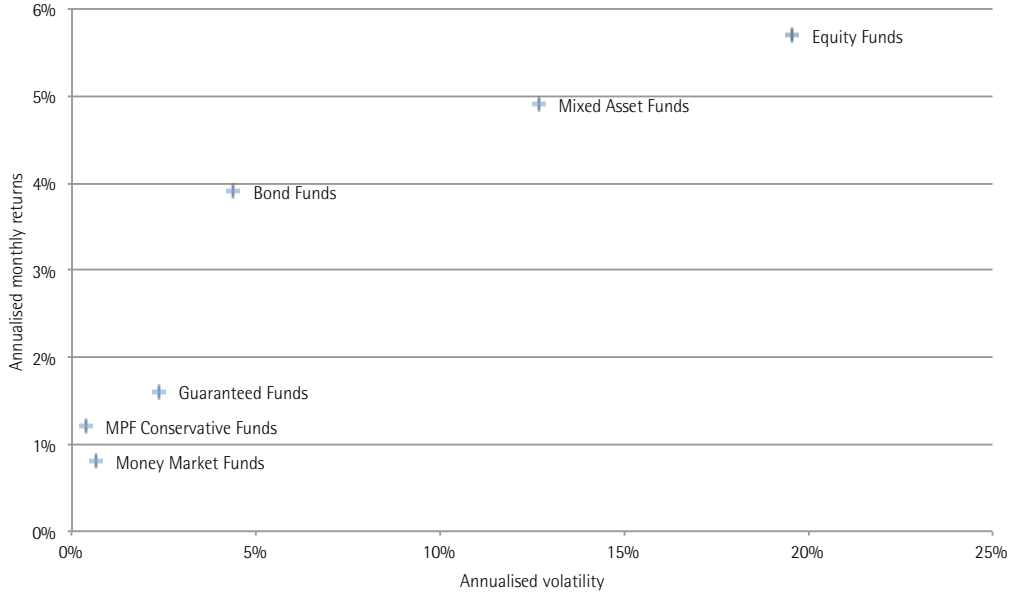
11. Appendix: Hong Kong

Figure 61: MPF Constituent funds asset allocations by geography, 2011



Source: MPFA

Figure 62: Annualised performance of MPF constituents, 2001-2011



Source: MPFA

11. Appendix: Hong Kong

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About AXA Investment Managers

About AXA Investment Managers

AXA Investment Managers (AXA IM) is a multi-expert asset management company within the AXA Group, a global leader in financial protection and wealth management. With approximately €554 billion in assets under management, AXA IM is one of the largest European-based asset managers, employing over 2,400 people around the world and operating out of 22 countries.

It is acknowledged as a thought leader and key player in the asset management industry, owing to its innovative and entrepreneurial mindset, the recognised excellence of its research, and the quality of its investment solutions and services. AXA IM services the specific, evolving needs and expectations of a wide variety of clients, ranging from the AXA Group and its insurance companies, to distributors and institutional investors.

AXA IM's multi-expert business model is composed of 7 separate asset class-focused areas of expertise, each of which is amongst the leaders in its respective field. It also has a Multi-Asset Client Solutions team composed of financial engineers, structured product developers, fiduciary management and asset allocation specialists who develop the most relevant, best-fit solutions for clients.

- AXA Fixed Income
- AXA Framlington
- AXA Rosenberg
- AXA Funds of Hedge Funds
- AXA Private Equity
- AXA Real Estate
- AXA Structured Finance

These teams of experts are backed by the strength and scalability of shared support functions such as Research & Investment Strategy, Responsible Investment, Risk Management and Trading. And their product offerings are the building blocks with which the Investment Solutions team builds fit-for-purpose solutions that meet the highest industry standards. Visit us at www.axa-im.com

About EDHEC-Risk Institute

About EDHEC-Risk Institute

Founded in 1906, EDHEC is one of the foremost international business schools. Accredited by the three main international academic organisations, EQUIS, AACSB, and Association of MBAs, EDHEC has for a number of years been pursuing a strategy of international excellence that led it to set up EDHEC-Risk Institute in 2001. This institute now boasts a team of 90 permanent professors, engineers and support staff, as well as 48 research associates from the financial industry and affiliate professors.

The Choice of Asset Allocation and Risk Management

EDHEC-Risk structures all of its research work around asset allocation and risk management. This strategic choice is applied to all of the Institute's research programmes, whether they involve proposing new methods of strategic allocation, which integrate the alternative class; taking extreme risks into account in portfolio construction; studying the usefulness of derivatives in implementing asset-liability management approaches; or orienting the concept of dynamic "core-satellite" investment management in the framework of absolute return or target-date funds.

Academic Excellence and Industry Relevance

In an attempt to ensure that the research it carries out is truly applicable, EDHEC has implemented a dual validation system for the work of EDHEC-Risk. All research work must be part of a research programme, the relevance and goals of which have been validated from both an academic and a business viewpoint by the Institute's advisory board. This board is made up of internationally recognised researchers, the Institute's business partners, and representatives of major international institutional investors. Management of the research programmes respects a rigorous validation process, which guarantees the scientific quality and the operational usefulness of the programmes.

Six research programmes have been conducted by the centre to date:

- Asset allocation and alternative diversification
- Style and performance analysis
- Indices and benchmarking
- Operational risks and performance
- Asset allocation and derivative instruments
- ALM and asset management

These programmes receive the support of a large number of financial companies. The results of the research programmes are disseminated through the EDHEC-Risk locations in Singapore, which was established at the invitation of the Monetary Authority of Singapore (MAS); the City of London in the United Kingdom; Nice and Paris in France; and New York in the United States.

EDHEC-Risk has developed a close partnership with a small number of sponsors within the framework of research chairs or major research projects:

- **Core-Satellite and ETF Investment, in partnership with Amundi ETF**
- **Regulation and Institutional Investment, in partnership with AXA Investment Managers**
- **Asset-Liability Management and Institutional Investment Management, in partnership with BNP Paribas Investment Partners**
- **Risk and Regulation in the European Fund Management Industry, in partnership with CACEIS**
- **Exploring the Commodity Futures Risk Premium: Implications for Asset Allocation and Regulation, in partnership with CME Group**
- **Asset-Liability Management in Private Wealth Management, in partnership with Coutts & Co.**

About EDHEC-Risk Institute

- **Asset-Liability Management Techniques for Sovereign Wealth Fund Management, in partnership with Deutsche Bank**
- **The Benefits of Volatility Derivatives in Equity Portfolio Management, in partnership with Eurex**
- **Structured Products and Derivative Instruments, sponsored by the French Banking Federation (FBF)**
- **Optimising Bond Portfolios, in partnership with the French Central Bank (BDF Gestion)**
- **Asset Allocation Solutions, in partnership with Lyxor Asset Management**
- **Infrastructure Equity Investment Management and Benchmarking, in partnership with Meridiam and Campbell Lutyens**
- **Investment and Governance Characteristics of Infrastructure Debt Investments, in partnership with Natixis**
- **Advanced Modelling for Alternative Investments, in partnership with Newedge Prime Brokerage**
- **Advanced Investment Solutions for Liability Hedging for Inflation Risk, in partnership with Ontario Teachers' Pension Plan**
- **The Case for Inflation-Linked Corporate Bonds: Issuers' and Investors' Perspectives, in partnership with Rothschild & Cie**
- **Solvency II, in partnership with Russell Investments**
- **Structured Equity Investment Strategies for Long-Term Asian Investors, in partnership with Société Générale Corporate & Investment Banking**

The philosophy of the Institute is to validate its work by publication in international academic journals, as well as to make it available to the sector through its position papers, published studies, and conferences.

Each year, EDHEC-Risk organises three conferences for professionals in order to present the results of its research, one in London (EDHEC-Risk Days Europe), one in Singapore (EDHEC-Risk Days Asia), and one in New York (EDHEC-Risk Days North America) attracting more than 2,500 professional delegates.

EDHEC also provides professionals with access to its website, www.edhec-risk.com, which is entirely devoted to international asset management research. The website, which has more than 58,000 regular visitors, is aimed at professionals who wish to benefit from EDHEC's analysis and expertise in the area of applied portfolio management research. Its monthly newsletter is distributed to more than 1.5 million readers.

EDHEC-Risk Institute: Key Figures, 2011-2012

Nbr of permanent staff	90
Nbr of research associates	20
Nbr of affiliate professors	28
Overall budget	€13,000,000
External financing	€5,250,000
Nbr of conference delegates	1,860
Nbr of participants at research seminars	640
Nbr of participants at EDHEC-Risk Institute Executive Education seminars	182

About EDHEC-Risk Institute

The EDHEC-Risk Institute PhD in Finance

The EDHEC-Risk Institute PhD in Finance is designed for professionals who aspire to higher intellectual levels and aim to redefine the investment banking and asset management industries. It is offered in two tracks: a residential track for high-potential graduate students, who hold part-time positions at EDHEC, and an executive track for practitioners who keep their full-time jobs. Drawing its faculty from the world's best universities, such as Princeton, Wharton, Oxford, Chicago and CalTech, and enjoying the support of the research centre with the greatest impact on the financial industry, the EDHEC-Risk Institute PhD in Finance creates an extraordinary platform for professional development and industry innovation.

Research for Business

The Institute's activities have also given rise to executive education and research service offshoots. EDHEC-Risk's executive education programmes help investment professionals to upgrade their skills with advanced risk and asset management training across traditional and alternative classes. In partnership with CFA Institute, it has developed advanced seminars based on its research which are available to CFA charterholders and have been taking place since 2008 in New York, Singapore and London.

In 2012, EDHEC-Risk Institute signed two strategic partnership agreements with the Operations Research and Financial Engineering department of Princeton University to set up a joint research programme in the area of risk and investment management, and with Yale School of Management to set up joint certified executive training courses in North America and Europe in the area of investment management.

As part of its policy of transferring know-how to the industry, EDHEC-Risk Institute has also set up ERI Scientific Beta. ERI Scientific Beta is an original initiative which aims to favour the adoption of the latest advances in smart beta design and implementation by the whole investment industry. Its academic origin provides the foundation for its strategy: offer, in the best economic conditions possible, the smart beta solutions that are most proven scientifically with full transparency in both the methods and the associated risks.

EDHEC-Risk Institute Publications and Position Papers (2010-2013)

EDHEC-Risk Institute Publications (2010-2013)

2013

- Deguest, R., L. Martellini, and V. Milhau. Hedging versus insurance: Long-horizon investing with short-term constraints (February).
- Amenc, N., F. Goltz, N. Gonzalez, N. Shah, E. Shirbini and N. Tessaromatis. The EDHEC european ETF survey 2012 (February).
- Padmanaban, N., M. Mukai, L . Tang, and V. Le Sourd. Assessing the quality of asian stock market indices (February).
- Goltz, F., V. Le Sourd, M. Mukai, and F. Rachidy. Reactions to "A review of corporate bond indices: Construction principles, return heterogeneity, and fluctuations in risk exposures" (January).
- Joenväärä, J., and R. Kosowski. An analysis of the convergence between mainstream and alternative asset management (January).
- Cocquemas, F. Towards better consideration of pension liabilities in european union countries (January).
- Blanc-Brude, F. Towards efficient benchmarks for infrastructure equity investments (January).

2012

- Arias, L., P. Foulquier and A. Le Maistre. Les impacts de Solvabilité II sur la gestion obligataire (December).
- Arias, L., P. Foulquier and A. Le Maistre. The Impact of Solvency II on Bond Management (December).
- Amenc, N., and F. Ducoulombier. Proposals for better management of non-financial risks within the european fund management industry (December).
- Cocquemas, F. Improving risk management in DC and hybrid pension plans (November).
- Amenc, N., F. Cocquemas, L. Martellini, and S. Sender. Response to the european commission white paper "An agenda for adequate, safe and sustainable pensions" (October).
- La gestion indicielle dans l'immobilier et l'indice EDHEC IEIF Immobilier d'Entreprise France (September).
- Real estate indexing and the EDHEC IEIF commercial property (France) index (September).
- Goltz, F., S. Stoyanov. The risks of volatility ETNs: A recent incident and underlying issues (September).

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- Amenc, N., F. Goltz, V. Milhau, and M. Mukai. Reactions to the EDHEC study "Optimal design of corporate market debt programmes in the presence of interest-rate and inflation risks" (May).
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- Amenc, N., F. Goltz, M. Masayoshi, P. Narasimhan, and L. Tang. EDHEC-Risk Asian index survey 2011 (May).
- Guobuzaite, R., and L. Martellini. The benefits of volatility derivatives in equity portfolio management (April).
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- Amenc, N., F. Cocquemas, R. Deguest, P. Foulquier, L. Martellini, and S. Sender. Introducing the EDHEC-Risk Solvency II Benchmarks – maximising the benefits of equity investments for insurance companies facing Solvency II constraints - Summary - (March).
- Schoeffler, P. Optimal market estimates of French office property performance (March).
- Le Sourd, V. Performance of socially responsible investment funds against an efficient SRI Index: The impact of benchmark choice when evaluating active managers – an update (March).
- Martellini, L., V. Milhau, and A. Tarelli. Dynamic investment strategies for corporate pension funds in the presence of sponsor risk (March).
- Goltz, F., and L. Tang. The EDHEC European ETF survey 2011 (March).
- Sender, S. Shifting towards hybrid pension systems: A European perspective (March).
- Blanc-Brude, F. Pension fund investment in social infrastructure (February).
- Ducoulombier, F., L. Lixia, and S. Stoyanov. What asset-liability management strategy for sovereign wealth funds? (February).
- Amenc, N., F. Cocquemas, and S. Sender. Shedding light on non-financial risks – a European survey (January).
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- Amenc, N., F. Goltz, L. Martellini, and D. Sahoo. A long horizon perspective on the cross-sectional risk-return relationship in equity markets (December 2011).
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- Deguest,R., L. Martellini, and V. Milhau. Life-cycle investing in private wealth management (October).
- Amenc, N., F. Goltz, L. Martellini, and L. Tang. Improved beta? A comparison of index-weighting schemes (September).
- Le Sourd, V. Performance of socially responsible investment funds against an efficient SRI index: The impact of benchmark choice when evaluating active managers (September).
- Charbit, E., Giraud J. R., Goltz. F. and L.Tang. Capturing the market, value, or momentum premium with downside risk control: Dynamic allocation strategies with exchange-traded funds (July).
- Scherer, B. An integrated approach to sovereign wealth risk management (June).
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- Martellini, L., and V. Milhau. Capital structure choices, pension fund allocation decisions, and the rational pricing of liability streams (June).
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- Amenc, N., F. Goltz, L. Martellini, and L. Tang. Improved beta? A comparison of index-weighting schemes (April).
- Amenc, N., F. Goltz, L. Martellini, and D. Sahoo. Is there a risk/return tradeoff across stocks? An answer from a long-horizon perspective (April).
- Sender, S. The elephant in the room: Accounting and sponsor risks in corporate pension plans (March).
- Martellini, L., and V. Milhau. Optimal design of corporate market debt programmes in the presence of interest-rate and inflation risks (February).

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2010

- Amenc, N., and S. Sender. The European fund management industry needs a better grasp of non-financial risks (December).
- Amenc, N., S, Focardi, F. Goltz, D. Schröder, and L. Tang. EDHEC-Risk European private wealth management survey (November).
- Amenc, N., F. Goltz, and L. Tang. Adoption of green investing by institutional investors: A European survey (November).
- Martellini, L., and V. Milhau. An integrated approach to asset-liability management: Capital structure choices, pension fund allocation decisions and the rational pricing of liability streams (November).
- Hitaj, A., L. Martellini, and G. Zambruno. Optimal hedge fund allocation with improved estimates for coskewness and cokurtosis parameters (October).
- Amenc, N., F. Goltz, L. Martellini, and V. Milhau. New frontiers in benchmarking and liability-driven investing (September).
- Martellini, L., and V. Milhau. From deterministic to stochastic life-cycle investing: Implications for the design of improved forms of target date funds (September).
- Martellini, L., and V. Milhau. Capital structure choices, pension fund allocation decisions and the rational pricing of liability streams (July).
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- Martellini, L., and V. Milhau. Asset-liability management decisions for sovereign wealth funds (May).
- Amenc, N., and S. Sender. Are hedge-fund UCITS the cure-all? (March).
- Amenc, N., F. Goltz, and A. Grigoriu. Risk control through dynamic core-satellite portfolios of ETFs: Applications to absolute return funds and tactical asset allocation (January).
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- Goltz, F., and V. Le Sourd. Does finance theory make the case for capitalisation-weighted indexing? (January).

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- Till, H. Who sank the boat ? (June).
- Uppal, R. Financial regulation (April).
- Amenc, N., F. Ducoulombier, F. Goltz, and L. Tang. What are the risks of European ETFs? (January).

2011

- Amenc, N., and S. Sender. Response to ESMA consultation paper to implementing measures for the AIFMD (September).
- Uppal, R. A short note on the Tobin Tax: The costs and benefits of a Tax on financial transactions (July).
- Till, H. A review of the G20 meeting on agriculture: Addressing price volatility in the food markets (July).

2010

- Amenc, N., and V. Le Sourd. The Performance of Socially Responsible Investment and Sustainable Development in France: An Update after the Financial Crisis (September).
- Amenc, N., A. Chéron, S. Gregoir, and L. Martellini. Il faut préserver le Fonds de Réserve pour les Retraites (July). With the EDHEC Economics Research Centre.
- Amenc, N., P. Schoeffler, and P. Lasserre. Organisation optimale de la liquidité des fonds d'investissement (March).
- Lioui, A. Spillover Effects of Counter-Cyclical Market Regulation: Evidence from the 2008 Ban on Short Sales (March).

Notes

Notes

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