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Minimum pension guarantees

Introductory report

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1. Background

Why are minimum pension guarantees such a hot topic lately? In many parts of the world, the trend has been to reduce government liability under mandatory public retirement systems and encourage individuals to assume more responsibility in planning for their retirement - by moving away from pay-as-you-go financed defined benefit systems to mandatory, partially or fully privatized defined contribution systems (individual accounts). With this shift in responsibility, individuals are now faced with the important decision of how best to manage their retirement accounts so that the accumulated capital can ultimately be converted to an adequate retirement income. Proponents of paternalistic approaches to providing retirement income are concerned that individual pension assets can yield returns much lower than wage growth. Still others believe that due to inadequate financial literacy, individuals may be exposed to capital market risk without sufficient understanding of potential consequences - a risk accentuated by the recent decline in stock market performance around the world, and the hype surrounding the coverage of the Enron situation. Concerns over such financial market volatility and the uncertainty of the impact it can have on the ability of defined contribution systems to deliver an adequate retirement income have prompted some governments to include "guarantees" to pension provisions.

The Oxford Dictionary defines a *guarantee* as "a formal promise or assurance, that an obligation will be fulfilled", while a guarantee fund is "a sum pledged as a contingent indemnity for loss". In the case of a minimum pension guarantee, it involves a promise to assure that pensions will be at least of a specified level, and there will possibly be some "topping up" from a guarantee fund or other sources so that the capital accumulation will be sufficient to fund for the promised level of pension.¹ Bearing in mind a fundamental economic principle, however, one must assume that when there is value to someone (in this case the individual), it must have a cost and someone has to pay (i.e., there is no free lunch). Hence guarantees are definitely not free, and as the paper will show, guarantees do not come cheap either.

¹ World Bank 1994, "Averting the old age crises".

The conceptual focus of this paper is on mechanisms that can modify the link between benefits and contributions as applied to **mandatory** defined contribution systems such that ultimately the overarching goal of old age income security can be achieved. So, for the purpose of this paper, the term “minimum pension guarantees” will not be confined to its narrow technical definition as a single type of pension provision. Rather it will be used in a broader sense as a way of determining when triggers will be activated to protect individuals from “poverty” or from receiving a pension that is “below expectation” upon retirement. In this context, “guarantees” and “minimum guarantees” are used interchangeably and can include guarantees made on different types of pension provisions, whether they are in the form of benefits or rates of return, and whether absolute or relative benchmarks are involved.

This paper considers the following issues: (1) *purpose* - why is the assurance of a minimum guarantee necessary; (2) *types of guarantees* - what are the different kinds of guarantees that are commonly used to achieve the intended purpose; (3) *financing* - what mechanisms are used to fund the guarantee; (4) *stakeholders and guarantors* - who benefits and who pays; (5) *cost drivers* - what factors influence the final cost; (6) *plan design and perverse incentives* - how can perverse incentives be mitigated; and finally (7) *conclusions* - lessons learned.

2. Purpose of a minimum pension guarantee

If indeed the ideological goal of protecting retirees from abject poverty were sufficient to explain the driving force behind the provision of pension guarantees, the solution might appear rather simple. In recent years, however, many countries undergoing pension reform have resorted to establishing individual accounts. Given the vulnerability of individual accounts to financial market volatility, governments have succumbed to pressures and opted to offer some form of minimum guarantee, in an effort to make it easier to gain political support for the conversion from a defined benefit to a defined contribution system. Notwithstanding, implementation often implies trade-offs between different priorities, and this is particularly difficult to resolve for countries with poor governance structure. It is therefore critical that objectives are articulated clearly at the outset and that they can be explicitly prioritized.

We can identify four potential purposes served by a minimum pension guarantee: (i) for social protection - so that no one will fall below a particular income threshold after retirement; (ii) for equity - so that all participants receive roughly similar returns or replacement rates² from the system; (iii) for protection against financial market risk - so that volatility inherent in the financial market can be moderated; and (iv) for protection against cohort risk - so that individuals who may have to live through extended depressed economic periods can still receive an adequate pension.

3. Types of guarantees

Broadly speaking, guarantees may be provided in four different ways:

- (a) As an absolute benefit level - providing a designated anti-poverty benefit expressed as a flat pension or as a percentage of some minimum wage level or cost of living benchmark (poverty line, minimum wage or average wage of the economy) so no one would fall below a certain income threshold.

² Defined as the value of the pension expressed as a percentage of a worker's wage in the year before retirement or his average lifetime earnings.

- (b) As a relative benefit level - granting a specified percentage of the individual's own earnings level (i.e., ascertaining the target replacement rate can be realized at statutory retirement age with a specified number of years of contribution) thus addressing the concern for equity, in relation to the prevailing standards of a country's pension provisions.
- (c) As an absolute rate of return - declaring a pre-specified return on investment, including guaranteed return of contributions and guaranteed real return of contributions, regardless of actual performance, thus providing some protection against financial market risk.
- (d) As a relative rate of return - declaring a return in relation to a market benchmark, some average of a universe of funds or a pre-determined synthetic portfolio regardless of actual performance, thus addressing the concern for equity within a pension system, in terms of acceptable benchmarks chosen for the country.

It is important to note that guarantee types specified under (a) and (b) can be thought of as conditions that require the pension fund to generate a certain implicit rate of return such that when compounded over the contributory life of an individual, it will accumulate sufficient capital to produce the desired benefit levels (absolute or relative). However, the implicit rate of return required under (a) is different for each worker, depending on the worker's wage profile and years of contribution. This implicit rate of return would be comparatively higher for individuals with low lifetime earnings (hence low accrual in their pension account), whereas the rate of return would be negligibly low (or even negative) for individuals with high lifetime earnings (assuming identical years of contributions for both).

It is also worth noting that a guaranteed absolute rate of return granted in the form of a guaranteed return of contributions, i.e., zero nominal rate of return, may vary in real value due to variability in inflation, whereas a guaranteed real return of contributions, i.e., zero real rate of return, has zero variability in the real value of the rate guaranteed. Finally, the actual rate granted under guaranteed relative rates of return may fluctuate depending on the selected reference point, and can only be known *ex post*. In some cases, governments have opted for multiple guarantees - guaranteeing the returns by limiting the volatility of the investment portfolio and setting a minimum for the pensions received after retirement.

4. Financing

To ensure that pension accounts have sufficient funds to meet their stated objectives, there needs to be pre-determined mechanisms for financing the promised benefits, including processes for mobilizing funds whenever the intervention points are triggered. Intervention points could be annual or multi-period, at retirement, or even at specified events.

For guarantees that involve providing a minimum pension benefit, the intervention point is usually at retirement, and involves an assessment at that point to determine if a guarantee is due. Governments usually finance the costs for such guarantees out of general revenues. Hence, when designing minimum pension guarantees, it is essential to strike a balance between what is expected and what is affordable. Overly generous guarantees may expose retirees to the political risk that the guarantees may have to be scaled back when governments have to exercise budget austerity.

As for guarantees that involve fund performance, it is customary that the intervention point is triggered over relatively short time periods (one to three years generally). In this case, shortfalls are made up sequentially from a range of potential funding sources. There are several ways of financing return guarantees: (i) from resources within the pension fund; (ii)

from the capital of the pension fund manager; (iii) from a central guarantee fund; and (iv) from the government. The mechanisms invoked and the order in which this is done will vary across countries and regions.

In Latin America, a shortfall in return is made up, firstly, from the yield fluctuation reserve; secondly, from the managers' cash reserve; and finally, from the private capital of the fund manager. If this is insufficient, then the fund is wound up and the shortfall made up by the government. In Hungary and Poland, fund managers from both countries maintain a yield fluctuation reserve within the fund to meet any shortfalls. Each country has also set up a central pension guaranteed fund that is financed by pension funds paying a specified percentage of contributions or assets. The central fund steps in when the reserve funds have been exhausted. In the event that the central guarantee fund is insufficient, the government is responsible for making up the difference. When financing guarantees, it should be noted that the cost may be different for plan members, fund managers and the government, depending on many factors such as plan design, labor market characteristics and prevailing macro-economic conditions. How this cost is shared has implications for income redistribution and inter-generational transfers.³

5. Stakeholders and guarantors

Within the broad grouping of guarantees by purpose and by nature of the benefit provision, there are many other parameters that govern and impact who stands to benefit under what circumstances and who is liable in what ways. In other words, there are diverse criteria that can be built into the design of minimum pension guarantees, which in turn precipitate the application of regulations that may generate important consequences for different stakeholders.

One important set of such parameters has to do with the definition of eligibility conditions (or lack of), as well as how and when they get applied. Eligibility can be targeted or non-targeted, with implications for financial management obligations.

If eligibility is targeted, the criteria may be contingent on asset and income levels, and/or contingent on performance of individual accounts. These criteria may be applied in conjunction with specified times or periods - annually, a specified period (e.g., rolling average of any number of years), at the end of the working lifetime, or some other condition yet to be defined. On the other hand, if eligibility is non-targeted, then guarantees will kick in independent of wealth status or investment performance of the pension accounts. For example, in the case of universal social pension when everyone above a certain age is eligible, the obligation to pay is a certainty, as long as the individual survives to the specified age. This is analogous to granting those eligible an additional benefit. The provision of the additional benefit will inherently increase people's risk preference in the management of their pension accounts.

Another group of parameters is with respect to how pension assets are managed, whether publicly or privately, for public and private accounts often exhibit different risk-return characteristics and are exposed to different market volatilities.

Private accounts are freer to invest in various types of funds and tend to carry portfolios with different asset mix. They usually encourage diversity and take into account the performance of the funds. There may be greater potential rates of return, but they also face greater

³ Smetters, 2000.

volatility. Therefore market-based risks must be carefully analyzed and assumptions concerning them clearly stated when determining the associated costs of guarantees.

Publicly managed reserves are subject to more government restrictions as to what are permissible asset categories and limits. Criteria for investing are not necessarily related to superior performance, and there may be biases towards investing in less efficient domestic projects. Palacios and Iglesias (2001) showed that most publicly managed reserves underperformed those managed by the private sector. The implication is that the probability of earning inferior returns is high, and market risks may be even more difficult to predict when selection is not based on performance. In addition, there is a high probability that funds held in these accounts may be used for other purposes - the so called political-economy risk, thus affecting the amounts that are finally available when needed. Assets held by public pension plans can be spent on other programmes, which may simply be recorded at book value when the fair market value may be significantly lower or nonexistent. However, such discrepancy would not be picked up by periodic reporting and could go undetected for years, thereby passing the fiscal burden on to future generations. Smetters (2000) also concluded that private accounts are superior in handling political-economy risks.

Government liability is a critical area that needs to be examined explicitly under a variety of scenarios. Since nearly all guarantees when provided by the private sector are limited liability guarantees, it is important to bear in mind that ultimately, governments shoulder the unlimited liability for making up shortfalls after all other sources of financing have been exhausted, thus creating contingent liabilities. The need for governments to assume the role of ultimate guarantor is corroborated by many country examples.⁴

Moreover, for some types of guarantees, where eligibility and the intervention point happen at the end of the working lifetime, it is simply not possible to make claims from either the pension fund or the fund manager. This is because the failure to deliver the necessary returns may not lie with one manager or one pension fund, and the outcome can only be determined ex post, i.e., upon retirement, after extended periods of under-performance. In such cases, only a central guarantee fund or the government can be relied upon to provide the necessary supplement for bringing the terminal value of a pension account to the required level.

Irrespective of the financing arrangements, as long as there is economic value to the individual, he/she will be bearing an economic cost, be it implicit or explicit, in part or in full. If the guarantees are financed from the resources of the pension fund or the fund manager, such costs will be factored and buried into the pricing of the services rendered and will be paid directly or indirectly by the members. If the guarantees are being paid by a central guarantee fund, contributions to finance such a fund will also be financed indirectly by the members. When the government is responsible for the shortfalls and pays for them out of the general budget, that source of revenue is drawn from the taxpayers. Prudent financial management of guarantees aims at making each stakeholder's share of the cost more transparent and avoid unintended intra- or inter-generational transfers to the extent possible.

6. Cost drivers

The biggest barrier to sustainable financing of minimum guarantees is the lack of transparency in costs - both to the plan and to government, resulting in inadequate funding and/or overly generous benefits. It is therefore very important to conduct systematic and

⁴ Turner and Rajnes, 2000.

complete cost analysis with valid assumptions, and come as close as possible to a measurement of the true costs, although the process can be rather cumbersome.

The cost of a guarantee depends on what form the guarantee takes, how long it runs, what are the permissible investments in the account and ultimately the size of the eligible population. For minimum pension guarantees that are provided as a stand alone provision, regardless of economic conditions or performance of the defined contribution system, the cost drivers are dependent primarily on the generosity of the system (the benefit level) and whether the benefit is targeted or non-targeted.

For example, Mauritius provides a universal pension of approximately 20 % of average wage to all persons age 60 and over,⁵ subject to some lenient residency requirements (no residency requirement after age 70). The cost of providing such a benefit currently stands at 3 % of GDP and is paid for by general revenues. Since the pension payment is non-targeted (i.e., everyone meeting the age requirement will automatically receive the pension), the key cost drivers are the demographic profile of the population and wage growth. Using an assumption that average wage will increase in line with changes in GDP per capita, projections show that Mauritius' fiscal burden for this system will rise to somewhere between 6 - 7 % of GDP in 50 years.

In contrast to Mauritius, Hong Kong provides a similar system of old age pension, except that in this case, those under age 70 are subjected to some means-testing, and the benefit level is less than 10 % of average wage. Although Hong Kong is expected to experience a more serious aging phenomenon than Mauritius, the fact that the benefit level is kept low and that some level of targeting is being administered helped to keep the cost down - around 1.2 % of GDP in 2001. Australia also has a means-tested old age pension. However, because of the high take-up rate - 83 % of retirees of eligible age (for women, aged 61.5 and over; for men, aged 65 and over) - the cost of the programme runs around 3 % of GDP.

For guarantees that are triggered by adverse conditions, such as under- performance (or anticipated under-performance) of a defined contribution pension scheme, it is analogous to a guarantor of a funded pension offering a put option (the right to sell something at a pre-determined price) to individuals. If the terminal value or the actual rate of return of the individual account is below the guaranteed level, the put option will be "in the money", the retiring person will cash in and the guarantor will pay up.

In situations where only the principal of the investment is guaranteed (zero nominal return), the cost is relatively cheap and becomes cheaper the longer the guarantee runs. A recent article from *The Economist*⁶ reported that according to a study conducted by The Wharton School, University of Pennsylvania, it was estimated that, assuming that the moneys are invested in a passive portfolio made up of 50 % bonds and 50 % equities, the cost of guaranteeing the principal would be only 0.2 % of all contributions after 10 years, and would fall to zero soon after. Even when inflation is taken into account (zero real return), the cost would still be quite low: 2 % of contributions 10 years out, declining to 0.5 % of lifetime contributions after 40 years. The reason why the guarantee gets cheaper over time is that the value of the principal, whether nominal or real, becomes smaller relative to the total

⁵ Older persons (age 75 and over) receive an even higher pension.

⁶ "Underpinning returns", *The Economist*, May 9 2002.

expected value of the investment which includes cumulative interest and capital gains. Hence the guarantee offers little or no benefit over long periods of time.⁷

If, however, a minimum terminal value is guaranteed, the cost of the guarantee rises with time. According to the Wharton study, the cost of such a guarantee would be considerable, and would go higher the longer the fund is held - with contributions increasing from 8 to 16 % over 40 years based on the same passive portfolio of a 50-50 split in bonds and equities. This revelation is counter intuitive to the all so familiar view that the volatility of equities (measured as standard deviation of annualized returns) declines over time. However, when a minimum terminal value is guaranteed, it is the total cumulative returns that matter, and the volatility of total returns increases with time because investors are exposed for longer to the risk of a really bad setback.

In both these quoted estimates, the time horizon being considered is relatively long - the working lifetime of the individual. These types of guarantees are not too common up to now, except for the options considered by the commission set up to study the United States Social Security Reform. In any case, the commission did not include guarantees in its final proposals to the President. The more common types of guarantees, as seen in most of the Latin American countries, are in the form of absolute or relative rates of return over relatively short periods (from one to three years). This strategy makes sense for these countries where mandatory funded accounts provide the lion's share of an individual's retirement income.

On the other hand, for countries where a significant first pillar still exists, e.g., many of the countries in Eastern Europe, it may not be as logical to provide minimum guarantees, at least not with respect to the defined contribution system alone. Otherwise, if the bulk of the retirement income is in fact "guaranteed" under the pay-as-you-go defined benefit system, and the concern over market risk is so great, it might make more sense to bypass the market and simply fund the defined benefit system adequately. Poland, for example, provides a guarantee to top up the total pensions from both the first and second pillars to a minimum level that is specified yearly, although a guaranteed fund is also being set up to supplement the traditional pay-as-you-go first pillar.⁸

Following the example of Chile, pension reforms in many Latin American countries over the last two decades have adopted some type of minimum return guarantees (albeit varied in actual structure) as well as the provision of a state guaranteed minimum pension as a social safety net. See annex for a summary of minimum return conditions of some selected countries.

In summary, pension guarantees of principal (i.e., absolute nominal or real return guarantees) are cheap because they offer relatively little or no benefit over long periods. Minimum terminal value guarantees (and thus minimum income guarantees) offer a substantial benefit which makes them comparatively expensive. As for the cost of relative return guarantees, they are sensitive to the standard deviation of the individual's portfolio return as well as the correlation between the individual's portfolio return and the performance of the benchmark portfolio against which it is being measured.

For universal pensions that are available to all citizens or residents who attain retirement age, demographics and wage level are the primary cost drivers, and robust actuarial models

⁷ "Underpinning returns", The Economist, May 9 2002.

⁸ In 1999, the minimum pension guarantee was around 33 % of average wage, net of contributions (World Bank staff working papers, 2002).

can easily project liabilities associated with minimum pension guarantees. If, however, these universal pensions are contingent upon qualification via means-testing, separate economic development and poverty assessment analysis will have to be undertaken to estimate the likely proportion of the future population that will be eligible. In case where minimum pension guarantees are linked to economic conditions or performance of the mandatory defined contribution scheme, stochastic analysis on the likely financial outcomes will have to be performed first on the asset side. Results from these stochastic simulations can then be linked to the liability projections to examine the probable cost implications. More recently, advances in contingent claims analysis have provided insights for valuing pension guarantees by using the martingale pricing approach, also known as the risk-neutral valuation method to value a variety of guarantees on pension fund returns.⁹ In a study presented to the World Bank using this approach, the cost of providing minimum absolute return guarantees against typical Latin American investment portfolio characteristics came to about 4 to 7 % of total assets per year. If however, the Chilean style of relative return guarantee were to be provided, the cost would be of the order of 2 to 4 % of assets per year.¹⁰

7. Plan design and perverse incentives

For the purpose of designing a minimum pension guarantee that is most appropriate for a particular country, it is important to have a broad perspective of what key components ought to be addressed and to make sure that the structure of the system should be consistent with stated objectives and applicable criteria.

The following table is helpful for seeing at a glance what type of guarantee is most appropriate for which intended purpose, with the corresponding eligibility criteria and expected ultimate guarantor. Depending on the desired level of income guarantee, the goal of protecting against cohort risk can be realized using any one of the four types of guarantees described. However, since the eligibility condition is triggered by specified exogenous market conditions, it should be applied at the time of retirement to avoid over compensating those who still have contributing years left for making up losses that resulted from depressed market conditions. The government appears as an ultimate guarantor across all four types, which underscores the importance of accounting for the cost of pension guarantees within government budgets.

⁹ Pennacchi and Fischer have separately written on how to use a discrete Martingale framework and a binomial solution to price minimum return guarantees.

¹⁰ World Bank, Pension Reform Primer. www.worldbank.org/pensions.

Purpose	Type of guarantee	Eligibility	Guarantor
Social protection - antipoverty	Absolute benefit level	Can be universal, means-tested or contingent upon other criteria; guarantee applies at time of payment	Government
Ensure equity among contributors	Relative benefit level or relative rate of return	Determined annually or at time of retirement	If annually, can be the pension fund manager, or the government. If at time of retirement, only the government can be the guarantor
Protect against capital market risk	Absolute minimum rate of return	Ibid	Ibid
Cohort risk - in case of extended depressed economic cycles	Absolute or relative benefit level	Determined at time of retirement based on specified exogenous market conditions	Government

All forms of insurance protection generate the problem of moral hazard. Knowing that losses are “protected” or “insured”, people tend to take less care to avoid events that could trigger guarantees. For example, both fund managers and individual investors may opt for more risky assets in the hope of getting higher returns. According to Walliser (2002), moral hazard generated by guarantees can be countered through monitoring, pricing of guarantees and regulation. Risks can be monitored by regular review of portfolios so that early intervention can be carried out to correct the situation. If government guarantees are triggered there should be a cost to fund managers. Guarantees can be required to be at least financed partly by self-insurance on the fund’s resources or those of the fund managers. A price of the guarantee in the form of an insurance premium will have to be paid to the government ex ante. Government regulations can also restrict the choice of assets although this can prevent competition, reduce diversification and contribute to loss in efficiency.

Some observers have blamed the requirement to guarantee rates of return and portfolio restrictions for causing fund managers to exhibit “herding” behaviour in order to avoid being outliers in the distribution of returns or relative to a benchmark.¹¹ This effect is compounded by the short investment horizons used for assessments, even though pensions themselves are long-term investments.¹² However, it is well established that even in the absence of portfolio restrictions, “herding” can occur simply because of competition, especially in markets with limited investment choices.

Perhaps the greatest danger with guarantees is that their costs, both in terms of the cost to pension members and the potential liability to government, are not transparent. This lack of transparency encourages governments to offer or impose larger guarantees than would have been deemed sufficient if the costs to fund members and the government budget were more clear.

¹¹ Herding is a phenomenon used to describe the behaviour of fund managers when they regress towards the same type of portfolio and stay away from potentially more rewarding but volatile investments.

¹² Chile has shifted from annual to three-year rolling returns, while Poland opted for two-year averaging.

8. Conclusions

Providing guarantees on returns for defined contribution schemes may gain political support for reform, but poorly designed guarantees can undermine this and create huge liabilities. In deciding which type of guarantee to adopt, it is useful to first determine the intended purpose of the guarantee so as to avoid granting a pension amount that exceeds or underrates the original mandate. It is also important that the design of minimum pension guarantees should optimize the multi-pillar approach in ascertaining national old-age income security. Thus, if the first pillar provision is weak, the minimum guarantee may be expected to play a more important role in protecting individuals with low lifetime earnings from having to live below the poverty line. It therefore makes sense to emphasize the use of a targeted minimum pension guarantee as a social safety net and fund for it from general revenues. On the other hand, if the guarantee is seen more as a supplement to protect unlucky cohorts who happen to retire at a time when financial markets under-perform for extended periods, the eligibility criteria may be different. In these cases, it is best to establish specific requirements for conditions under which such cohorts would qualify for the subsidy. In order to meet the cost of the guarantee in the down years, a contingency reserve financed with revenues from taxing above-average returns in the up years can be set up to finance the associated costs.

Adopting guarantees without proper planning and careful costing is risky business. It is prudent financial management to calculate the cost of guarantees *ex ante*, before the value of underlying risks are realized, and to be as transparent as possible with cost factors. Using a discrete martingale approach, it is possible to project all costs involved (with or without a ceiling), which allows the pricing of a minimum pension guarantee as well as cost comparisons of the underlying features. These projections are very helpful in providing a theoretical basis for understanding how much pension guarantees cost, but successful implementation of these guarantees is dependent to a large extent on whether risk-free assets with the right duration are available in practice. Having sufficient reserve funds, the right type of assets and managing the accounts prudently are all-important elements for ensuring that retirees receive their proper entitlements. Forcing funds to put aside their own assets will provide better incentives for fund managers and encourage transparent financing.

In principle, the provision of pension guarantees appears to be a predominantly public policy decision with little impact on individual pocketbooks. In practice, however, the ultimate cost of such a feature is borne by individuals either explicitly through insurance premiums, or implicitly as taxpayers when government acts as the guarantor of last resort. Without proper design that includes reasonable eligibility criteria, cost allocation to minimize perverse incentives, sustainable financing and effective risk management, minimum guarantee pension systems may fail to deliver as promised. In addition, the ultimate fiscal burden may fall more heavily on those who can least afford it, i.e., those with lower lifetime earnings and/or savings, or the lion's share of the liability may be passed on to future generations. Some of these consequences may not be immediately apparent or be difficult to track, unless the methodology and assumptions are made very explicit and well documented. As such, lack of transparency and unexpected or unintended transfers of fiscal burden can become major barriers to the sustainability of guaranteed pension benefits.

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Annex

A synopsis of minimum return of pension funds in selected countries

Country	Absolute	Relative
Argentina	Bank deposit rate	$\min(70\% N_{\text{average}}, N_{\text{average}} - 2\%)$
Chile		$\min(50\% R_{\text{average}}, R_{\text{average}} - 2\%)$
Colombia		$\min(N_{\text{average}}, \text{benchmark portfolio})$
Croatia		up to discount rate of Central Bank
El Salvador		$\min(50\% R_{\text{average}}, R_{\text{average}} - 2\%)$
Hungary	25 % of public scheme benefit	15 % - yield on govt. bond index
Malaysia	$N_{2.5\%}$	
Mexico	$\max(100\% \text{ of old public scheme benefit, } 1997 \text{ minimum wage in real terms})$	
Peru		$\min(50\% R_{\text{average}}, R_{\text{average}} - 2\%)$
Poland		$\min(50\% N_{\text{average}}, N_{\text{average}} - 4\%)$
Singapore	$N_{2.5\%}$	
Switzerland	$N_{4\%}$	
Uruguay	$R_{2\%}$	$\min(R_{2\%}, N_{\text{average}} - 2\%)$

Notes:

1. $\max(x,y)$ means select the maximum of x and y.
2. $\min(x,y)$ means select the minimum of x and y.
3. $R_x\%$ means real return of x %.
4. $N_x\%$ means nominal return of x %.
5. R_{average} means the average real return of the system.
6. N_{average} means the average nominal return of the system.