

Managing investment risk in Chilean pension funds

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1. Introduction

The main objective of this document is to opine on the systems of managing investment risk in Chilean pension funds. This includes those already established under the current regulatory framework as well those stemming from the analysis the Superintendencia de Pensiones carried out in determining pension risk measurement.

This report is a concise look at the current situation regarding the management of investment risk. It compares international standards that define best practices in managing investment risk and governance of pension funds. The report looks at the work of the Superintendencia with respect to pension risk as a maximum exponent of mitigating risk in pension funds not only in investments, but also from a holistic perspective. This is commented on through specialized literature. Finally, suggestions are made to strengthen the tools of managing risk in the Chilean pension system.

Before getting to the details of the document, let us put the Chilean situation in context regarding not only in managing investment risk in its pension funds, but also in general with what a pension model means. Chile has been a pioneer and a reference of a considerable number of pension reforms², which, up until now has overcome the dichotomy between the Bismarckian models and those models advanced by Lord Beveridge³. This means that we are talking about a young model, in spite of having existed for 30 years and still being a work in progress. Chile has also been able to introduce notable changes to the original model which has tried to adapt the suitability to the needs of the populace with the recent reforms of 2008 (Barr and Diamond 2010).

The mandatory defined contribution models which make up the base of the pension system, as in the case of Chile, mean a different challenge with regards to its management,

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² Literature is abundant. For example, for analysis from different points of view, one can consult Barr and Diamond (2008), Diamond and Valdés-Prieto(1994), Gill, Packard and Yermo (2005), Mesa-Lago (2007) or Holzmann and Hinz (2005)

³ The literature on the German and Anglo-Saxon model is quite extensive. For example, one can consult Monereo *et al* (2010)

than other classic pension systems, whether they be defined benefit, defined contribution but voluntary, or at least not having a significant part in the national pension scheme.

These, in general, transfers the risk to the contributing worker, which will build his/her pension based on his/her contributions to the system and in which he/she is responsible for its profitability as well as to his/her life expectancy (Berstein *et al.* 2010). Therefore, the global risk in these systems can be understood as not reaching a given level of benefits at the time of retirement (Blake 2006), and in concrete, this level is a fixed percentage of the replacement rate, understood as the ratio between pension and salary (Berstein *et al.* 2010). This risk is usually called pension risk.

In writing this report, “working papers” from the web site Superintendencia de Pensiones de Chile⁴, are pre-eminently featured and are cited throughout the document. Some aspects of *behavioural economics* are also considered, especially when referring to default options, inertia or herd behaviour.

Opinion and suggestions will be expressed after analysing the aforementioned document, reviewing specialized literature and taking into consideration the experience of the authors.

2. Fundamental guidelines in managing investment risk

The reference regarding *best practices* that we will use is the OECD/IOPS Good Practices guide for pension fund’s risk management systems (OECD/IOPS 2011) published in January 2011. The managing risk regulation considered is in the current body of regulations in Chile, especially Circular n° 1727 of September 24, 2010, which will enter in force April 1, 2011. We also used the Regimen de Inversión de los Fondos de Pensiones⁵

From our point of view, the Chilean regulation, especially Circular n° 1727, adheres to the principles of the Guide to which they are applicable.⁶ Principle n°4, referring to Investment Policy, is reflected in the modification of Article 50 of the Decreto Ley 3.500

⁴ <http://www.spensiones.cl/573/propertyvalue-1832.html>

⁵ All of these regulation can be found at Superintendencia’s web site, <http://spensiones.cl/573/propertyvalue-1710.html>

⁶ For example Principle n° 3 is not, which applies a defined benefit system

made by article 91 of the Law 20.255, which implements the reform of 2008. With the information at our disposal, we cannot be certain that article 50 was developed as a lesser regulatory status as stated in the Law. We understand that Circular n° 1438 is still being in force and whose content is sufficiently aligned with Principle n° 4 as mentioned above.

Berstein *et al.* (2010) make an expansive examination of the main risks that the Chilean pension system faces, and what can be done to mitigate these risks. Their vision goes beyond the pure conceptualization of classic financial risk (market, credit, operational), which gives it a more global outlook. They especially focus on so-called pension risk to. In brief these are:

- Risk associated with contribution: the absence of contributions during a period of the workers active life, especially in the early years, hinders savings. Informal work (or the self-employed not contributing)) and the absence of women in the active workforce are two indicative points.
- Risk associated with investments: the expected value (and its volatility) of the pension is the long term objective, which can be threatened by short term thinking (by incentives to the manager), potential conflict of interests, fiduciary risks (mandatory system and lack of financial knowledge of those enrolled) and re-investment (converting the savings into a life annuity).
- Risk associated with operations: operational risk is found throughout the pension process, from the moment when contributions are tracked for effectiveness, to the investment process and up to retirement. This, in a backdrop where there is a general lack of financial knowledge by those enrolled and who would most likely not detect problems that may arise regarding the operations of their pensions.
- Risk associated with the institutional solvency: although the Pension Fund Administrators (PFAs) maintain their net worth separate from the pension funds, bankruptcy of the administrators can still threaten the pension funds, and into the decumulation process, the insurance company's insolvency would indeed have considerable impact.
- Risk associated with decision-making process: the decisions the affiliates must take are considerable and all crucial. An erroneous decision can have very negative consequences in the long term. Educational level does not prevent bad decisions.
- Risk associated with life expectancy: it is the affiliate who assumes the longevity risk. He/she can hedge by insuring the pension and can decide when to retire depending

on the amount of funds saved. This will require accurate counselling some years before retirement age.

The following is an outline of the measures that the Chilean legislation provides in order to mitigate these risks, in the opinion of the authors. These are:

- The obligation to contribute and the incentive to save: especially focused towards those groups considered more vulnerable such as the self-employed, women and young people. There is an additional focus to voluntary saving incentives.
- Investment regulation: moving towards models based on risks, yet still includes a wide variety of quantitative limits. The creation of an independent Technical Investment Council, guarantees objectivity when setting limits. The role of multi-funds, whose management is based on the *life cycle*, is one of the most relevant tools in risk management.
- Explicit responsibility of the PFAs: the requirements for the obligatory reserves (*encaje*) is an economic reflection of responsibility in cases of minimum yield not being reached. It is mandatory having both a clear policy regarding the handling of conflict of interest issues and an investment policy for each individual fund. An independent committee reporting to the Boards of Directors, to supervise must guarantee compliance of these policies.
- Minimum return guarantees: the minimum return cannot be below the system average in relative terms for over a period of 36 months. The PFA must offset the difference of the possible *underperformances* with its own funds.
- Risk based supervision: the gradual introduction of prudent supervisory criteria requires a strong commitment from the industry and the supervisory body. To define, establish, implement and monitor risk management practices are essential elements in the supervision process. The focus on processes and internal control systems is as much a challenge for the market as for the supervisor.
- Information for affiliates: during the active life of the worker, there is an obligation to provide pension projections for those over 35 years of age. As they approach retirement, information regarding the impact of receiving their pensions early or later is also provided. The role of the certified pension assistant was created to help the enrolled worker make informed decisions as to the type of benefits he/she wishes to receive.

- Alternatives at retirement: an insured life annuity, or programmed withdrawal where the retiree bears the longevity and investment risk. An old age reserve was introduced to offset this risk. There are also alternatives that combine both ways of withdrawing the pension.
- The new solidarity pillar: is a basic, non-contributory pension for people who, have not participated in the pension regime, or on the other hand, as a compliment to reach a minimum level for those who have contributed below the minimum.

Berstein *et al.*(2010, 2011a, 2011b) highlights the importance of regulating the multi-funds as a way to approximate the *life-cycle* system as well as the existence of a default option as a way to mitigate the effects of inertia and heuristic behaviour⁷. They also consider the risk control measurement based on the short term is not the best indicator of pension risk: the use of *Value-at-risk* (VaR), while useful for other types of investments, loses its power in long-term investments. The investment horizon does not allow the assumptions and information in which the VaR is based on, to forecast accurately, nor is it of great use when managing long-term investments.

In this context, they propose a pension risk measurement that stochastically determines a random variable (the replacement rate) which is affected by four factors: accumulated return of the funds investments, accumulated volatility of the investment strategy, volatility associated with contributions to the system and the cost associated with annuitization. A similarity to this process can be found in Blake (2006). There is also a practical application in Antolín *et al.* (2009).

3. Some weaknesses in risk management

This section analyses and highlights some of the more common practices carried out by in the PFAs that directly affects the management of investment risk. The objective is not to make a global analysis of pension fund performance and the entities that administer⁸ them, but to describe in detail the elements that are detrimental to effective risk management and the investment process.

⁷ The following epigraph deals more in depth on this issue

⁸ More information can be found web site of the Superintendencia de Pensiones de Chile, www.spensiones.cl, or on the web site of FIAP, www.fiap.cl

Barr and Diamond (2010) draw attention on the difficulty of real competition among the PFA given the high concentration of a few PFAs joined in the need to guarantee a minimum return, does not incentivise differentiation. However, the lack of options in itself is not a problem. *Behavioural economics* analysis (Tapia and Yermo, 2007, Thaler and Benatzi, 2004 or Mitchell and Utkus, 2003), and summarized by Barr and Diamond (2010) show the main implications for designing pension systems are:

- To avoid immobilizing funds through an easy to choose system, such as having a reduced number of funds that are clearly differentiated (the multi-funds in Chile).
- Auto-enrolment, default enrolment system (in Chile's case, enrolment is mandatory).
- To design effective default options when the affiliate fails to chose a fund (in Chile this is done by assigning different risk profiles of the funds according to age brackets).

The chapter of minimum return guarantees is one of the areas of dispute in the Chilean model. The PFA is required to guarantee a minimum return based on the market performance itself and will put up its own net worth if the minimum returns are not met (a reserve was created called *encaje*, endowed with its own funds, in proportion to the managed funds, so as to offset any drop in the minimum return).

Castañeda y Rudolph (2009) compare the performance of funds with minimum return guaranteed based on reference group performance (*peer -group*) as in the Chilean case with *index-based* funds. They show that in the first case, this was not the most optimal way to limit the risk of financial deterioration since what is most important is the relative *performance* with respect to the market. Both authors consider that an *index-based* system obtains better results. In any case, the existence of minimum return guaranteed leads to a certain amount of herd behaviour. Barr and Diamond (2010) agree, they assert that in countries with minimum return regulation there is a lack of true diversification among investment portfolios and, therefore in results.

Raddatz y Schmuckler (2010) and Opazo *et al.*(2010) consider that short term incentives of the managers, such as minimum return guaranteed, constrict investment decisions. According to these authors, the *timing* of the investment is linked to volatility in such a way that this is pro-cyclic and based on the short term. It is true that long-term investments offer better performance but risk and volatility are also higher. Further on, we will comment on the extent which asset valuation criteria (*market to market*) may

influence this. Indeed, if the long-term investment horizon is a risk factor, and the manager's performance measurement is short term, the portfolio management strategy ends up being short term. This provides the funds with much liquidity, mismatched with long-term liabilities and with little differentiation among the different portfolios.

The fund manager not only answers to the market and the regulator due to the minimum return. It must also compete in the market to capture new members in a setting where past performance (*rear view mirror*) takes precedence in such a way that it is not just a reference, but portfolio management is actually based on past performance. Raddatz and Schmuckler (2010) show that investment policy criteria is based on *buy and hold*. Assets are bought and sold on behalf of the PFA and there is not any real *trading* activity, nor is there any foreseeable development of the secondary market (there is in the primary market, where the PFA usually turn to).

This is a reasonable description, in our opinion, of a system where *liabilities* that cover the long term do not exist, such as a defined contribution system. A system with relatively few participants in the supply market, yet with obligatory demand and where bad results are punished compared with the short term. The affiliate is the only one that assumes long-term risk, which is the risk that his/her pension not be sufficient to maintain just a desired standard of living, but an essential standard of living (Blake and Boardman, 2010).

In summary, these are the elements to consider in managing risk:

- The regulation on minimum reserve guarantees.
- The criteria of asset valuation.

Which, at the same time cause:

- Short-term vision in investments.
- The herd effect due to a lack of portfolio diversification.
- Reduced competition in fund management leading to reduced performance.
- A lack of dynamism and the absence of incentives to improve portfolio management.

Additionally, Antolín *et al.*(2009) points out some potential problems in the design of the *life-cycle* system with default options, since these are always optimal. The analysis highlights

the convenience of setting investment options, with default options or the establishment of quantitative limits in investments. These have already been incorporated into the Chilean law.

4. Recommendations

We now offer a series of recommendations for the Chilean system that will increase efficiencies in the PFAs and benefits to the enrolled members. These all fall under the financial framework of mandatory savings in Chile.

Recommendations on other pension risk variables that are not related to financial management have not been included. Also not included were measures that avoid or reduce contributions throughout the working life. This is relevant to pension risk, yet it calls for measures dealing with labour laws not financial laws.

The recommendations have been divided into three groups: risk management, the multi-fund system, and alternatives to pension withdrawal.

4.1. Risk management

In this section, we include all the recommendations which, in one way or another, are related to risk management, and specifically, we analyze the consequences and the alternatives to the current definition of minimum return, a change with regards to the quantifications of the obligatory return (encaje) and the application of a Socially Responsible Investment policy by the PFA.

- Minimum return

The Chilean system has a mechanism in which each FPA is responsible for ensuring that that its real average return over a period of 36 months not be below the minimum return of:

- The real annualized return over the previous 36 months as an average of all the funds of the same type, less 4 percentage points for Funds Type A & B, and less than 2 percentage points for Funds Type C, D & E.
- The real annualized return over the previous 36 months as system average, to which it belongs, less 50% absolute value of said return.

The minimum yield system is therefore referred to as an industry measure (*peer group*). Inevitably, the establishment of a minimum return influences the decisions of the managers of pension fund portfolios. Their decisions, aimed at maximizing long-term risk-return paring, are based on the behaviour of its competitors in the short term in order to avoid negative economic consequences to the PFA.

It is natural for PFAs to maintain similar investment strategies in their portfolios as the competition since straying from consensus would increase the probability of an economic setback in the event minimum return is not reached.

This type of minimum return referred to as an industry average, incentivizes short-term investments, and can negatively affect the affiliates' performance over the long term. Since there is no motive to innovate, this can cause, to a larger or lesser degree, a herding effect in the PFA investment decisions. Finally, it does not motivate the PFA to search for better efficiencies with regard to risk return. The comparison with the competition to establish the minimum return to beat, and the pressure itself of selling the pension funds lead the PFA, in general, to maintain bonds less than duration of its liabilities.

The incentive for short-term investment originates as well from the criteria in valuing bonds: *mark-to-market* valuation carries market volatility to the daily value of the portfolio even though those assets are maintained to maturity. The pension fund manager invests in the short term to protect itself from the negative impact of temporary increases in interest rates that will have a negative bearing on the portfolio's valuation. Though *market to market* is a widely accepted criteria, international accounting standards do consider other definitions of *fair value*, and another consideration in asset valuation means a change that goes beyond a simple accounting valuation. Nevertheless, this point should be studied in more depth in another report at a later time.

Our proposal does not mean to eliminate the minimum return, since this is a guarantee of solvency for the Chilean affiliates, but to change the reference on which it is calculated. We suggest eliminating the comparison with the PFAs average and to define a new criteria based on the asset market. This is represented by index by asset class and geographic areas, which are convenient, and fulfil certain characteristics, such as investment time horizon (minimum return based on *benchmark*).

The application of this new reference would require the PFAs to calculate a “*performance attribution*” of each of their funds, obtaining, by asset class, the performance in comparison with index selected as representative of the market. Through “*performance attribution*”, we can breakdown in detail the return by each asset class providing evidence of the output of the manager’s decision. There are two types of decisions, these are: security selection, or measuring the added value through a selection of assets within each category the allocation of assets, or contribution by weight allocated to the different asset category within pre-established bands.

With this information, a minimum return could be established based on the performance margins by asset class. This will help to avoid having a well-managed asset class hide the excessive risk assumed in other categories.

This definition of guaranteed minimum return, apart from promoting efficiency and innovation in management, could resolve a generalised problem in pension funds. This problem is the lack of consistency in the time period of not having the portfolio adjusted to the structure liabilities to the affiliates. This produces a mismatch between the duration of assets and the fund obligations. Establishing references for bond indexes over a longer time period produce an increase in the incorporation of these assets that would improve the consistency in the time period which in turn would increase long-term returns.

- Encaje

The PFA which manages those funds whose annualized returns over the previous 36 months have not reached the legally established minimum returns, must compensate the difference between both returns.

The resources for this compensation is withdrawn from the encaje, which is 1% of the total portfolio managed. If there are not sufficient resources to face the difference in returns, the PFA must use its own funds to meet the difference.

The definition of encaje as a unique percentage means equal treatment of all of the PFAs independently of their quality in managing risk. In other words, the PFAs are treated the same regardless of the difference in their risk management.

In our opinion, the encaje and the obligatory reserves the PFAs must have on hand in case of not obtaining the minimum return must match the risk assumed by each PFA. An approximate reference can be made with the Solvency II process regarding the insurance market. Since the encaje depends on the solvency margin, it should be based on the management of assets and liabilities of each PFA (similar to SCR- Solvency Capital Risk). As such, each PFA may have different capital requirements with regard to encaje. The calculation of capital should be based on the following risk factors:

- Asset risk: independently of the legally established limits in portfolio management regarding asset type and concentration, the investment manager continuously assumes risks while making decisions. These risks may include among others, the portfolio's creditworthiness, the concentrations of securities, by sector or country, the correlation between asset returns and the volatility or drops in value relative to interest rate movement. This new model of determining the PFA's net assets should initially identify the inherent risk of managing the assets and later establish limits for each PFA. If they are exceeded, this would lead to expanding the level of the PFA's own net assets.
- The risk manager: if we assume that the reference to determine the minimum return the PFA must ensure is not set as an industry average but is referenced to an index or benchmark, the risk manager will be led to distance itself from this index reference. In order for the manager to actively manage and beat its index reference, there must be margin to act. However, exceeding this limit may bring a higher risk that, if errors are made, the minimum return may not be reached. If we consider *tracking error* as the best manner in measuring indexing of portfolio management with respect to the benchmark, a level should be established which, if exceeded, the PFA should begin to gradually provide more funds from its own assets. This level would be different for each of the five types of funds.

- **Operating risk:** The PFAs that have developed and implemented internal control procedures; information systems with controls that minimize errors; internal auditing departments; and those that have defined complete contingency plans etc., assume less risk than the PFAs which have not done so. It is logical that the effort to control operating risk will also have a direct impact on the PFAs own assets. This awards the development operating risk control in the industry.

This system would aid in developing PFA risk management, favouring internal control by developing tools and internal management models. This would improve transparency and additionally allow for more efficient risk supervision.

- **Socially Responsible Investment**

In the area of risk management by the PFAs, we still must mention the lack of current regulations regarding one of the recommendations included in OCDE/IOPS (2011). The recommendation refers to the investment process and the question of analyzing the issuers of securities not only from a purely financial point of view, but also to widen the criteria to other non-financial criteria, which could have a relevant impact on the risk on the assets, included in the portfolios.

These non-financial criteria can be grouped into three categories: environmental, social and governance criteria. These should be implemented by defining a Socially Responsible Investment policy in each PFA with a clear minimum standard.

Companies that better manage their social, environmental and governance risk have been shown to better perform in the medium-long-term with the subsequent impact on their financial profitability (de Groot and Churet 2009).

Furthermore, implementing Socially Responsible Investment policies, for example, exclusion, allow the PFA to protect its image against damage to its reputation which could come from the affiliates in its system becoming aware that their savings are being invested in companies that carry out unethical activities or behave in a unethical manner.

4.2 The multi-funds model

In our opinion, the multi-funds system, or the application of investment strategies based on the life cycle of its members incorporating default options, is a suitable base to manage pension risk.

The establishment of five funds, each one with a different weight in equities, with age limitations to join some of them not only seem to us not an appropriate practice but also an advanced one where international practice is concern.

In spite of the good intentions of the multi-funds model, in moments of higher than average volatility (such as 2008) in equities, the volatility of each portfolio is much higher than the “normal” expected for the established weight in equities.

Therefore, in moments of exceptional market conditions, the funds may suffer significant drops in returns, higher than the expected maximum loss limit and must be accepted as a consequence of investing in equities. Total protection of the funds at all times from this volatility would mean being able to correctly anticipate the market, which, we can safely say is impossible to consistently do.

In accepting the consequences of being exposed to equities and matching the assumption of risk in the financial asset portfolios to the members investment horizon, we propose allocating the transfers among Funds B, C and D be carried out with an additional criteria of the member's age.

In the current model, the criteria for transferring funds are done based on the member's age, according to gender, at a rate of 20% of the balance each year.

Our proposal is to incorporate a transfer system among funds that link the moment and the rate of transfer not only to the member's age, but also to the pension amount equivalent to the real fund of the member in relation to the theoretical pension amount that he/she should have accumulated in order to obtain a certain pension replacement rate.

We believe that incorporating, apart from the member's age; the real return on assets and the member's contributions to the life cycle system is a better way to offset pension risk. Furthermore, it would lead to linking disinvestment of equities to bullish moments in the market. This is when the accumulated amount of the real pension is higher because the accumulated fund is higher.

The proposed transfer system among funds, for example between B and C would not be automatic upon the member reaching the age of 35. At this age, the member should have reached the replacement ratio target. If the member has not accumulated sufficient funds together with contributions and further returns, it would be necessary to delay the transfer of funds to a later age.

This is due to the necessity to assume a higher risk over a longer period if the member wants to reach the target, since higher expected returns increase the probability of obtaining the target pension upon retiring. Moreover, it helps to avoid having to disinvest in equities during bear markets, which is what leads to a lower pension amount upon reaching retirement. Antolín *et al.* (2009) also has plenty to say on this concept.

To the contrary, if the member with contribution and future returns has a sufficient level of funds before reaching 35 years of age, and he/she reaches the replacement target with a probability level done, there is no need for the member to assume a higher than normal risk in order to reach the target amount. At this time, the transfer to Fund C should begin and at a faster rate than 20% annually. In this way, the affiliate avoids the impact of a likely drop in the markets after years of bullish activity. These bull markets help the affiliate to accumulate funds at a higher rate than the theoretical rate in order reach the replacement ratio target.

The challenge lies in the difficulty of defining the statistical model that combines all of the previously mentioned models to arrive at defining a double entry table in which the transfer of funds are determined by age and the funds accumulated by each affiliate. This analysis must incorporate safeguards in order to avoid having the excess risk of those funds with lower returns lead to more government financing with which to guarantee the minimum pension. It also means a greater effort and better communication on behalf of the PFAs to focus on linking current returns to pension pay out upon retirement. In

other words, this means mitigating pension risk. At any rate, this could be another area for further study.

4.3 Alternatives to pension withdrawal

Currently, the alternatives to withdrawing pension funds upon reaching retirement means the members assume fairly high risks.

The choice of an annuity by the affiliate supposes that he/she will assume the risks related to credit, financial and longevity, in exchange for a promise of pension payment until death.

The first risk, and this is not the purpose of this report, is the credit risk of the insurance company. It is very important to have strong regulatory measures in order to guarantee the solvency of these insurance company. The financial risk is that the final pension payout will vary significantly depending on the interest rate curve at the time of retirement. Lastly, the longevity risk is that of saving ones entire working-life only to have it vanish upon death shortly after retiring.

On the other hand, choosing a programmed withdrawal carries with it different and at times contrary risks than those of an annuity. Upon choosing a withdrawal plan, the affiliate is not dependant on the return upon retirement, but on the return that the PFA obtains for his fund.

Furthermore, the longevity risk is the exact opposite to what we have seen in annuities since the risk is having a longer longevity and reaching a situation where the pension payout is not sufficient to maintain a minimum dignified standard of living. This comes at a time when there is a total incapacity on part of the retiree to generate income and adding to this situation is the likely-hood of an increase in medical expenses.

Because of this situation, we recommend an analysis of the different options of pension withdrawal analyzing the opposite risks to find new alternatives that combine both types of payouts with less risk for the member when withdrawing his/her funds. “Classic” annuities, but also “*variable annuities*”, and “*investment-linked annuities*” are instruments

whose differences can contribute to mitigating risk in the withdrawal phase (Blake and Boardman, 2010).

5. Conclusions

The system of mandatory defined contribution, which makes up the most and more relevant system of pension source for the population, face a greater challenge than any other system. Such as that of ensuring a suitable replacement rate, in other words, that the anticipated pension in proportion to the final salary, be at levels that allow reaching the targets for which it was created.

Pension risk is also called inherent risk when this level is not reached. Therefore, the main objective as far as policy is concerned must necessarily be to minimize this risk.

The anticipated pension can be modelled as a random variable in which, at least, three components are included: contribution history, the return obtained (inherent in any specific investment strategy), and the cost of converting the amount accumulated to a pension.

It must be noted that each one of these three components belongs to a different conceptual and regulatory area: i) to influence the contribution, there needs to be a change in the labour market, ii) to invest, there needs to be regulation on the conditions of the pension fund market and its administrators, and iii) to convert the pension, regulation of the insurance market is needed. In our opinion, this is the difficulty in adopting special regulatory measures on the pension fund industry, since this issue cannot be considered as a whole.

On the other hand, building a stochastic model that reflects pension performance, and from that to be able to measure pension risk (queue analysis, determining potential losses, the probability of higher losses at certain levels, in short, in purely financial terms, we call VaR and conditional VaR) is relatively complex and especially difficult for members to absorb and comprehend. We are facing a phenomenon where, according to surveys⁹, the most important principles and concepts that are fundamental to the system are unknown

⁹ For example, see EPS (2009)

to the population. So the introduction of an added element as complex as pension risk modelling would seem to be extremely difficult to implement.

With this in mind, our recommendations are more in the direction of regulatory intervention in some areas, but not as a whole. We think incorporating pension risk measures, although commendable and in the long term, necessary, is at this moment, more valid as an element in intellectual analysis than a policy tool. Hence, we suggest intervening in the three components separately, which is already underway:

- With regard to contributions, a continued insistence on legal measures to avoid the shortage of contributions throughout the working life of the affiliates, and that these contributions are maintained at adequate levels for the expected pension.
- Improve existing mechanisms in the pension market industry (guaranteed minimum return, and encaje, non-financial risk should not be converted to financial risk and regulation of the multi-funds).
- In the insurance market, expand the supply of products; promote those that guarantee longevity and interest rates, beyond those of the programmed withdrawal of index-level annuities.

Another question is providing information regarding expected pension levels; the information must be clear, simple, intelligible and truthful. The possibility that both the regulator as well as the PFAs could provide pension simulators can be analysed in the future.

The challenge of obtaining adequate pensions in these models is of such importance that any effort to limit pension risk will be well worth it.

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