

Chapter 1

Evaluating the Financial Performance of Pension Funds

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<<A>>Background and Motivation for the Research Program

Since the early 1980s, the structure of arrangements to provide retirement income has gradually moved from pay-as-you-go defined benefit (DB) systems to various types of arrangements in which the provision of pensions is backed by assets, either in individual accounts or in collective schemes. This change has been motivated principally by governments seeking to lessen the fiscal impact of aging populations and to diversify the sources of retirement income. One of the key results is that many pension systems are now in the process of becoming asset backed. This increasingly links retirement incomes to the performance of these assets, resulting in participants being exposed to the uncertainties of investment markets to determine the level of benefits they will ultimately receive. The potential consequences of this have never been more evident than during the recent global financial crisis.

Despite the abysmal performance of investment markets in 2008 and early 2009 and the effect on pension funds, most governments have remained steadfast in their commitment to the concept of funded arrangements. The rapid decline in asset values, however, has renewed debate regarding the underlying principles of linking benefits to asset performance and has led to considerable attention to enhancing the organization and operation of the arrangements currently in place. A small number of countries have reacted by reverting to traditional arrangements or by reducing or suspending contributions to pillar II schemes, but these actions appear to have been primarily motivated by short term fiscal considerations and are not admissions of the failure of the new arrangements.

Underlying much of the recent policy debate is the increasing recognition that pension fund assets have important differences compared with other forms of collective investments. Pension funds have the objective of providing income replacement in retirement whereas other forms of collective investments are primarily concerned with short-term wealth maximization. The differences in objectives result in different time frames over which performance should be considered and different attitudes to risk. Despite these distinctions, the performance measures that are typically applied to pension funds are identical to those used to evaluate the performance of other types of investments.

To date, the debate on optimal investment strategies and performance evaluation of defined contribution (DC) pension systems has taken place largely in the academic literature, with its impact on practical policy recommendations has been relatively limited. This is understandable given the relative infancy of funded systems in most

countries and governments' urgency in addressing other basic problems such as the high cost of the systems, governance issues, and approach to supervision.

Recognizing the emerging importance of measuring the performance of these funded pension systems, the World Bank and the Organization for Economic Cooperation and Development (OECD) established a partnership with three private sector entities, (BBVA, ING and the Dutch Association of Industry-wide Pension Funds [VB]) in late 2005 to undertake a program of research on these issues. This introductory chapter provides an overview of the issues and motivation for this work and summarizes the studies that were conducted and their main findings. It concludes with policy-related observations that arise from the overall consideration of the research program. The remainder of the volume contains a selection of the studies undertaken through the partnership that focus on developing approaches to evaluate performance of pension funds and concludes with observations and commentary from four noted experts in the field on the issues raised by this work and the interpretation of the findings.

<<A>>The Importance of Appropriate Measures of Performance

The spectacular losses experienced by many pension funds since the onset of the Financial Crisis in late 2008 is a topic that has been widely noted and debated. The OECD estimates the losses of pension funds in OECD countries to be \$5.4 trillion or about 20 percent of the value of assets in these countries in 2008 (Antolín and Stewart 2009). The returns of pension funds in Latin America and Central Europe in 2008 were two digit negative.

A focus on short-term nominal returns on investments, however, hides the fact that returns are only one of several factors that will determine the performance of pension funds to provide retirement income to their members. Others factors include administrative and investment management costs, the density of contributions, and the behavior of participants in choosing a retirement age.

The other factors that drive pension benefits in an asset backed setting have received much research and policy attention in recent years. For instance, countries have designed a variety of mechanisms to reduce costs, including the imposition of caps on fees (Central and Eastern European countries), centralization of collections and the use of blind accounts (Latvia and Sweden), lotteries that allocate new contributors among funds (Chile and Poland), and paperless transactions (Estonia). Policymakers are aware of the alternatives available, and the challenge is to ensure that the alternatives chosen are properly implemented.² Collective pension arrangements established by employers and employee associations can also be an effective way to keep costs low, especially when the funds established achieve sufficient scale (eg Netherlands, Denmark, and Iceland).

² Bernstein (2002), Valdes (2005), Calderon and Schwartz (2008), Impavido and others (2009) have addressed the issue of costs.

Density of contributions is also an important factor that has affected the pension benefits in countries with large informal sectors. According to Arenas (2005), the density of contributions in Latin American countries is only about 50 percent. Individuals with a low density of contributions are likely to face low accumulated assets at retirement age, and therefore are likely to have low retirement incomes. The retirement age is also an important factor that affects the performance of pension funds. Because the accumulation period is shorter in countries that allow individuals to retire earlier, individuals are likely to receive lower retirement income. As a consequence, governments in some countries have been raising the official retirement age or have introduced incentives to delay retirement. The capacity of funded individual account systems to deliver retirement income will be further challenged in this respect as life expectancy continues to increase in virtually all countries.

Although these factors are important in the overall performance of pension funds, the focus of this book is on investments and investment performance. It is primarily directed to evaluating what can be learned about the comparative investment performance of pension funds and consideration of how to undertake investment performance measurement within a framework that is derived from the particular characteristics and objectives of pension systems. Developing a performance measurement framework that is specific to pension funds is a relatively new topic in the literature. Since the seminal work of Campbell and Viceira (2002), many other papers have explored the issue of developing an optimal asset allocation for pension funds, which is derived from the principles of life cycle savings and risk management. The applied research presented in this book represents an initial attempt to link the main themes of the more theoretical academic literature with the available data on the financial performance of pension funds to support the development of practical policy recommendations.

The traditional approach of performance of pension funds has put excessive emphasis on short rates of return. Because the objective of mandatory second pillars is to ensure adequate retirement income to individuals, monthly or annual returns of pension are not totally meaningful if they are not measured against a benchmark or against an objective. In addition, once the alternatives faced by investors are different, international comparisons of returns or other measures of performance such as the Sharpe ratios might not be totally meaningful.

Some policy makers might be less interested in the performance measurement because they expect the market to provide the optimal asset allocation. Also, some governments have the implicit belief that the presence of competition in open DC pension systems helps to optimize the pensions of individuals. Pension fund managers will compete for funds, and individuals will select pension funds that optimize their own risk-reward preferences.

This competitive model assumes that contributors have the ability to identify factors that will determine the capacity to provide retirement income, evaluate the investment

performance of pension funds against these factors and make choices that optimize outcomes in relation to their individual circumstances. In practice, these factors are not readily available or easily understandable by the typical contributor. The information that is provided is usually limited or is a proxy for the relevant factors and, when available, is not easy to understand for most members.

In addition, considerable evidence exists of inertia, decision avoidance, and excessive risk aversion by participants in making choices. Because of the complexity of defining the optimal portfolio allocation, some governments have promoted other sources of competition, which may be irrelevant to the long term financial performance of funds.³ Some countries have considered mandating higher levels of information to the public to improve the capacity of contributors to make informed decisions, but these efforts could be wasted because contributors have a limited capacity to understand the complexities of the systems.⁴ This problem may be solved in part by improving the financial literacy of individuals, but it may take decades before the average contributor is in a position to make an informed decision about his or her asset allocation.

In the absence of more relevant long-term measures of performance, the existing emphasis on short-term returns creates incentives for pension fund managers to focus their efforts on maximizing short-term returns. However, the funds with better short term performance are not necessarily those best aligned with the long run performance of a pension system. The literature on strategic asset allocation provides numerous examples of cases where short-term asset allocation conflicts with longer term objectives, including selection of the risk-free asset, international portfolio diversification, and currency hedging strategies. In general, no assurances can be given that competition in the short-term will result in long-term optimal asset allocation (Campbell and Viceira 2002).

Regulatory restrictions on pension fund performance, such as the minimum return guarantee, may create additional disturbance in the equilibrium portfolio allocation that is reached in a competitive framework.

Policymakers have only partially addressed the issue of the investment performance of pension funds. As a way of increasing the contributors' responsibility for their own retirement income, some governments have opened up the number of investment opportunities through the creation of lifestyle pension funds that provide varying asset allocation approaches intended to produce different risk and return outcomes. The assumption implicit in this approach is that participants will be able to assess their own circumstances and select the fund best aligned with their longer-term objectives and risk capacity. However, these actions have not been accompanied by guidance to contributors on strategies that they can employ to optimize their expected pension

³ For example, competition on the quality of service in the case of Chile

⁴ For example, in 2007 the Lithuanian Association of Asset Managers proposed to make available to public the Sharpe ratios.

funds at retirement age.⁷ Although lifestyle funds are a step forward in recognizing the heterogeneity in the preferences and needs of individuals, the systems that permit lifestyle funds fail to recognize the complexity of the portfolio decision for the contributors. Governments are not comfortable giving recommendations on portfolio allocation. Although this reluctance is understandable, it is likely to result in individuals making suboptimal portfolio selections and ultimately receiving low levels of pensions in retirement. As documented by Campbell (2005), and Benartzi and Thaler (2007) when unable to make decisions, people tend to rely on simple heuristics that may end up being suboptimal.

One alternative that has developed to try to address the limited ability of participants to assess their optimal risk and return objectives and make adjustments as their age or other circumstances change has been the introduction of what have become known as life-cycle funds. The research presented in this volume provides a strong argument that defining an investment portfolio (and by extension a relevant performance benchmark) that is consistent with the objective of providing a reliable level of income at retirement is a complex challenge that requires consideration of a variety of factors that will vary among individuals on the basis not just of their age but a range of other factors as well. This suggests that to improve the long term performance of pension funds, regulation will have to move beyond the current reliance on market forces that function through competition and short-term incentives.

The need to rebalance the equilibrium between the government and the market in traditional DC pension systems is an important policy conclusion that can be extracted from this book. A likely way to address the challenge that emerges from the research would be to create a model set of life-cycle pension funds, which can serve as benchmarks against which the performance of pension fund managers can be measured. This would move the basis of competition from short-term returns to trying to beat the benchmark on the model sets. The asset allocation would depend not only on age, but also on other parameters, including contribution rates, density of contributions, benefits from other social insurance programs, patterns of lifetime earnings, risk preferences and correlations among these factors and asset returns. This suggests a challenging process through which these optimal portfolios for individuals with different characteristics could serve to inform investment choices and provide benchmarks against which the performance of pension fund managers could be measured. It is interesting to observe that such an approach is broadly consistent with the manner in which the control of investments is exercised in a hybrid DB system such as the Netherlands, in which asset allocations are regulated in consideration of the targeted, although not guaranteed, benefit stream. As such it would represent a continuation of the convergence that has begun to render the distinction between traditional DB and DC system increasingly irrelevant.

⁷Lifestyle funds or balanced funds are funds that rebalance their holdings automatically toward a target asset mix that remains constant over time. Lifecycle pension funds change the asset allocation over time toward more fixed-income instruments as individuals get closer to retirement age.

In this approach, governments will be required to take greater responsibility in defining long term investment strategies for pension funds. The implication of this interpretation is that by not defining guidelines for investment strategies, governments leave participants subject to day-to-day uncertainty, which diminishes the overall performance and may end up affecting the long-term viability of funded pension systems.⁸ The need for moving forward in the creation of life-cycle pension funds can be reinforced by the recent interest in Central European governments in granting some sort of guarantee on the real value of contributions to pension funds. It is postulated that the design of optimal portfolios and benchmarks may help to reduce the cost of these guarantees.⁹

<<A>>Overview and Summary of the Book

This book is an effort to bring together the limited information available on the performance of pension funds across a broad range of settings with some of the latest developments in the theoretical literature regarding portfolio allocation to consider how the design of pension systems can be improved to address these limitations. A few policy conclusions can be extracted from this exercise. At the most basic level the work indicates that rates of returns are a very limited indicator of pension fund performance and that the reliance on this indicator can be counterproductive; second, competition may not bring pension portfolios toward the optimal long-term allocation; and third, pension funds need to measure performance against optimal long-term benchmarks, the design of which is essential for optimizing the value of the benefits received at retirement. Finally, it is argued that governments can play an important role in setting up these optimal benchmarks, but should not interfere in asset allocation

The book comprised of six main chapters that present a selection of key work undertaken in the research project and four short essays together in a final chapter that provide additional policy observations and reaffirm the analysis in the context of the financial crisis. This introductory chapter summarizes the main issues raised by these studies and key aspects of their findings. The other chapters are organized in a way to allow the reader to move from a review of the available data to a policy discussion about the development of pension-specific benchmarks that are needed to support more meaningful evaluation of pension fund investment performance. The short essays provide observations and commentary about the interpretation of the work and challenges of life-cycle funds in the context of the financial crisis.

⁸ Experiences such as that of Argentina in 2008 reflect the view that governments may take a short-term view of market risk in DC pension systems.

⁹ These guarantees may be expensive and subject to moral hazard if they are managed in the context of lifestyle funds, but they can be much less expensive and with minimum moral hazard if they are offered in the context of optimal lifecycle benchmarks.

The book begins with a chapter by Pablo Antolin and Waldo Tapia. This chapter provides a brief summary of the effort undertaken by the OECD to compile information on privately managed pension funds. This effort yielded data from 23 countries for which data on the financial status and performance of pension fund were available,¹⁰ including a mix of personal and occupational pension systems, as well as DB and DC pension systems.

This chapter provides basic descriptive information on the various pension systems design parameters as well as a summary of the different approaches to investment regulation. The chapter's findings indicate a range of regulatory frameworks that might influence investment outcomes with the various countries imposing limits by instrument category, limits by issuer, limits by risk, minimum return guarantees, and limits on foreign holdings. The descriptive data indicate that among the OECD countries included in the sample, investment regulation is less prescriptive and based on prudent person principles. The information on asset allocation indicates that pension portfolios in Latin America and Central Europe are heavily dominated by allocation to bonds, which, in some cases, reaches above 90 percent of the value of the pension funds. Pension portfolios in OECD countries, excluding its emerging economies, show a greater balance between equities and bonds.

The chapter then provides estimates of the real returns for the pension systems of the countries included in the sample, for the period 2001-05 and calculation of the standard deviation of these estimated real returns.

In Chapter 3, Eduardo Walker and Augusto Iglesias extend the evaluation of performance using a risk adjusted sample of returns from pension funds in 11 countries for which adequate data are available to support such an exercise. Their chapter begins with a brief discussion of the applicability of standard measures of financial performance that focuses on the potential use of the Sharpe ratio to measure the ability of pension fund managers to provide a risk premium from the active management of the fund. The authors argue that pension fund performance should be focused on evaluating the value added by portfolio managers with respect to benchmarks. They clarify that performance measures are relative measures, and that to be meaningful they need to be compared against passive investment strategies. Simple measures of performance, such as returns, do not provide any point of reference and therefore are not informative with respect to the value added by managers. High returns of pension funds, for example, might be related to high interest rates in the economy or a country-specific risk premium arising from lack of development of the domestic capital market. Walker and Iglesias discuss different indices that can be used to measure performance and attribution of pension funds. These indices measure the value added of pension funds with respect to a portfolio of

¹⁰ The sample includes Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, El Salvador, Mexico, Peru, and Uruguay from Latin America; the Czech Republic, Estonia, Hungary, Kazakhstan, and Poland from Central and Eastern Europe; Australia, Canada, Japan, the Netherlands, Sweden, the United Kingdom, and the United States from the OECD; and the Hong- Kong economy.

the same style, but they do not analyze whether pension portfolios chosen by the managers are optimal or efficient from the perspective of the ability to provide a future level of income replacement.

Walker and Iglesias also counsel against international comparisons of traditional performance measures, including returns, volatility, and Sharpe ratios. They argue that in addition to the differences in investment alternatives, including different risk-free interest rates and different investment alternatives, pension fund managers in different countries are subject to different risks, including exchange rate risk and real interest risk, which make comparisons not meaningful. The authors argue that volatility cannot be considered as a comprehensive measure of risk, because intrinsic risk elements are found in countries with different levels of development. For example, Sharpe ratios tend to vary overtime and across asset classes, and therefore comparing pension funds that have invested differently or in different time frames may not always be relevant.

Walker and Iglesias use monthly data to calculate the Sharpe ratio for the pension funds of a sample of 11 countries.¹¹ Performance is calculated against four proxies for the risk-free rate: a short-term local rate, a local long-term rate, a short-term U.S. Treasury-bills rate, and the annual return on long-term U.S. Treasury bonds. They find that nearly all of the pension systems that they are able to examine have been able to deliver a significant risk premium over short-term local and U.S. interest rates, but the evidence is more mixed when the premium is evaluated against long-term interest rates. Two countries in the sample reported negative value added against long-term benchmarks, because pension funds invested in short-term assets in periods in which long-term interest rates were falling.

Chapter 4 begins the discussion of the development of benchmarks by examining the potential impact of imposing minimum return guarantees such as are currently in place in several countries. This addresses one of the threshold questions regarding the common belief that competition would drive portfolios toward optimal levels. In this chapter Pablo Castañeda and Heinz Rudolph analyze the equilibrium portfolios that can be reached when pension fund managers are subject to performance restrictions, such as minimum return guarantees. The analysis is based on a standard model of dynamic portfolio choice but includes strategic interaction among portfolio managers through relative performance constraints. The model follows the seminal work of Basak and Makarov (2008), which analyzes the portfolio equilibrium in the absence of restrictions and finds that portfolio allocation without performance measures can lead pension portfolios to single equilibrium, multiple equilibria, or no equilibrium at all. In this literature a pension system with multiple options in which individuals have limited capacity to understand the available options is likely to end up in multiple equilibria, suboptimal asset allocation, and low pensions for individuals in the future.

¹¹ Chapter 3 includes the following countries: Argentina, Bolivia, Chile, Estonia, Hungary, Mexico, Peru, Poland, the Netherlands, the United Kingdom, and Uruguay.

The equilibrium portfolios in the model used by Castañeda and Rudolph are a weighted average of portfolio policies that are optimal for different possible scenarios. The scenarios correspond to cases that are not restricted by the minimum return guarantees and in which at least one manager is restricted. The model shows that relative performance concerns play a crucial role in determining the optimal portfolios.

Depending on the relative performance constraints, Castañeda and Rudolph conclude that pension fund managers can move portfolio allocations to suboptimal levels. The authors suggest that in the presence of minimum return guarantees, and when pension fund managers are too prone to relative return standards, portfolio allocation may converge toward myopic portfolio allocation. In these circumstances the use of exogenously defined single-index benchmark portfolios can help to move pension portfolios toward optimal allocations. The main policy lesson that can be extracted from chapter 4 is that competition does not guarantee equilibrium with optimal portfolio allocation, and the presence of a minimum return guarantee may exacerbate the divergence with an optimal portfolio.

Chapter 5 by Olivia Mitchell and John Turner discusses the impact of human capital risk on the design of optimal portfolio allocation of pension funds. The authors suggest that employment volatility and fluctuations in labor earnings may have different effects on human capital accumulation and income replacement targets that will show an important impact on the way in which pension portfolios are designed.

Mitchell and Turner open the discussion with the need to define properly the concept of income replacement rate which they perceive as the ultimate outcome measure relevant to evaluating the performance of pension funds. Income replacement rates are defined as the amount of income a retiree receives from his or her pension compared with some level of preretirement income. This measure requires comparison of workers' pre retirement income flows and the resulting or expected flows in retirement. However, there is still disagreement about the correct measurement of this ratio, including the period to cover with regard to the earnings in the denominator (whether it is income immediately before retirement, in a few peak years, or entire average pay), net or gross income, and the indexation rule of the benefits. In addition, Mitchell and Turner discuss the impact of other factors including labor income shocks, and how they will have differing effects in DB-systems and DC-systems. This discussion highlights the importance of differences in the regulatory framework. These are especially important in how they may affect portability of benefits in DB systems when participants change jobs, the potential risks of bankruptcy of the pension plans, and the uncertainty about how shocks to labor income influence benefit payments within different system designs and regulatory regimes. This chapter also discusses the importance of the density of contributions on the future level of pensions in DC systems.

Chapter 5 explores how human capital risks translate into pension outcomes in different types of system designs including DB, DC and the recently emerging collective DC systems. Mitchell and Turner analyze the effects of wage-related shocks (skill obsolescence, health shock, disability shock, and labor force shock) and employment shocks (reduction of working hours, retrenchment, and retirement) on these pension systems. The analysis highlights that the typically assumed “classic humped-shape earnings profile” may not be empirically sustainable and that the effects of different earning distributions may have an important effect on portfolio allocation. This leads to the conclusion that the diversity of patterns in wage distribution should be taken into consideration when pension portfolio allocations are decided. Mitchell and Turner suggest that to create a more realistic picture of the variability in labor earnings and employment patterns over the life cycle, countries will need to invest in longitudinal surveys of earning and employment patterns to have the information tracking individual workers over time that is necessary to inform the development of portfolios that are suited to the significant variations in human capital among workers and over time.

The focus of attention in chapters 6 and 7 is on developing methods to incorporate the ideas introduced in the earlier chapters into the formulation of a portfolio allocation that optimizes the ability of pension funds to smooth consumption and hedge the impact of human capital volatility to better achieve the income replacement objective of pension funds. Optimal portfolio allocation requires a sophisticated approach that includes an intertemporal optimization of pension portfolios, which needs to take into consideration numerous variables, including the risks of the different financial instruments, the age of individuals, human capital risk, and individual preferences. Policymakers in some countries feel confident that defining a limited number of lifestyle pension funds (typically between three and five) differentiated by boundaries on equity exposure is enough to design an optimal path of accumulation of pension funds. These chapters show that lifestyle funds are insufficient to create an optimal path of retirement savings, but can create the illusion to contributors that they are doing so.

To put these two chapters in perspective, life-cycle funds need to be built on well-defined benchmarks, and consequently regulations that solely impose maximum limits on different asset classes might not be enough to optimize the future pensions of individuals. For example, in a world where all equity instruments are homogenous, the only decision of individuals is the allocation to equities versus fixed-income securities. The lifestyle approach does not solve the problem of how much equity contributors need at each moment of time.¹² In current practice, the maximum exposure to equity tends to vary by country, being, for example 80 percent, 50 percent, and 30 percent for the cases of Chile, Estonia, and Mexico, respectively.¹³

¹² Leaving that decision to contributors, who are clearly unable to make an informed decision

¹³ In the Mexican case, the regulation requires individuals less than 30 years old to start moving to more conservative portfolios.

The maximum exposure to equity in these countries has not been derived from any optimization model and therefore cannot guide the decision of participants about the level of equity exposure that they should seek. Because lifestyle models also do not provide guidance about the preferred portfolio allocation, contributors are subject to the risk of underperforming returns.

The introduction of heterogeneity into the equity component complicates the situation even more. As many countries have experienced, pension funds may overinvest in equity in emerging economies, which might be optimal from a short-term perspective but suboptimal from the perspective of optimal portfolio allocation. Walker (2004) argues that in the late 1990s, Chilean pension funds had invested about 70 percent of the equity portfolio in the energy sector in Chile, which implies a high level of concentration in one particular sector, which is suboptimal from any perspective. Simple restrictions on maximum equity exposure without issuer or sector limits by pension might not prevent poor diversification of portfolios.

Examples can be given of short-term asset allocation not optimizing long-term portfolios and, consequently, acting against the long-term objectives of pension funds. Where the interest rate yield curve has been in backwardation and with the incentives that focused on short-term returns, many pension fund managers in convergence countries preferred to take short term positions contrary to the objectives of the funds and, with few exceptions, have performed significantly worse than had they invested in long term positions. Chilean pension funds between 2003 and 2007 experienced an economic climate of favorable terms of trade and the evolution of other macroeconomic aggregates, resulting in the domestic currency's appreciating against the dollar. During this period Chilean pension funds hedged most of their currency exposure to maintain returns that were comparable with their competitors. In the second half of 2008, during the global crisis, the local currency depreciated by about 30 percent and the main equity indices collapsed by about 40 percent. Pension funds were not able to benefit from the currency depreciation and suffered the cost of the collapse of the international stock prices, apart from the implicit cost of the currency insurance. The literature (Campbell, Serfati de Medeiros, and Viceira 2009) show that global falls in stock prices are correlated with appreciations in reserve currencies, therefore pension funds should have kept unhedged currency positions. Finally, it is interesting to see that DC pension funds that mark to market their portfolios tend to avoid investing even a small part of their portfolio in instruments with longer maturities, such as venture capital. The risk of these instruments is not the main impediment for investing in them, but the fact that returns in these instruments can typically be expected only after the fifth year. A pension fund that cannot show immediate results would be disadvantaged compared with its competitors that can show better short-term returns simply by investing in short-term deposits. There is therefore a bias against investing in instruments that cannot provide an immediate return.

Chapter 6 by Fabio Bagliano, Carolina Fugazza and Giovanna Nicodano addresses a number of methodological issues necessary to develop a life cycle model for optimal asset allocation of pension funds. The chapter also explores the relationships between strategic asset allocation and the degree of investor risk aversion and level of replacement rates. The model uses one riskless and two risky assets and introduces a positive correlation between equity returns and labor income. It reaches a key finding that income risk and correlation of equity returns to income shocks result in reductions to the optimal allocation of equities at any age.

The model is calibrated with parameters that are typically used in the United States and is used to predict an optimal portfolio allocation for DC pension funds. One interesting finding of Bagliano, Fugazza, and Nicodano is that the presence of idiosyncratic labor income shocks generates substantial heterogeneity in the pattern of financial wealth accumulation over time. Consequently, there is a potentially wide dispersion of the optimal portfolios across individuals of the same age. However, the dispersion tends to decrease as individuals approach retirement age. The results suggest that the optimal allocation needs to be implemented through diversified investment options that will vary by multiple parameters, including occupation, age, and risk aversion.

The results suggest that the welfare losses of grouping individuals along a defined set of benchmarks might not be as high as expected. Although models suggest an optimal asset allocation for each individual, this chapter validates the alternative of grouping individuals among benchmarks. Chapter 6 also discusses the welfare implications of some sub optimal strategies, an age rule, which allocates $(100 - \text{age})$ per cent to the risky portfolio, and the $1/N$ strategy, in which the portfolio is simply distributed equally among the available asset classes. The results confirm that applying these simple rules would have welfare costs in the range of 2-3 percent, but the cost varies depending on the degree of risk aversion, the financial wealth of individuals, and the correlation between retirement income and equity returns. In any case, simulations show consistently that welfare costs are lower in the case of the $1/N$ strategy compared with the age strategy. It is also noted that using a proposed metric, the welfare loss for these presumed passive strategies is similar if not less than the costs of active management.

Chapter 6 proposes that the performance of pension funds should be measured against a benchmark, but in terms of welfare, as opposed to simple returns. Traditional methods for performance evaluation of mutual funds are based on returns compared with the benchmark. These methods rely on the concept that a higher return to risk differential maps into better performance, overlooking the pension fund's ability to hedge labor income risk and pension risk of plan participants. In traditional methods of performance evaluation, it is not easy to identify whether performance is due to strategic asset allocation or short-term timing and security selection. Bagliano, Fugazza, and Nicodano suggest computing welfare ratios as the ratio of the worker's *ex ante* maximum welfare under optimal asset allocation, with his or her welfare level

under the actual pension fund asset allocation. The advantage of measuring performance in terms of welfare is that higher welfare may be due not only to a higher return per unit of financial risk earned by the pension fund, but also to a better matching between the pension fund portfolio and its members' labor income and pension risks.

Chapter 7 by Luis Viceira summarizes the policy recommendations that come out of the literature about strategic asset allocation for individuals. It suggests that asset allocation depends on a number of factors, including age, human capital, correlation between labor income and equity returns, the rate of contribution, and the presence of other sources of retirement income. The literature on strategic asset allocation assumes that individuals want to have the same asset allocation at all times, but the allocation takes into consideration not only financial wealth but also human wealth. The wealth of individuals is composed of both financial wealth and human capital wealth. Unlike financial wealth, human wealth is not tradable, and working investors can monetize only the dividends paid out by their human wealth, which are their labor earnings. Because they have not yet had the opportunity to accumulate savings, human wealth of young individuals typically represents the largest fraction of their wealth. For individuals close to retirement age, the opposite is true. Since the human wealth of individuals with safe jobs is equivalent to holding an implicit bond, young individuals are likely to compensate for this with a greater proportion of equity in their portfolios.

These findings are generalized through a discussion about the effects of the correlation between labor income and equity returns on portfolio allocation, which suggests that the higher this correlation, the lower should be the proportion of equity in pension portfolios. Viceira conducts a useful discussion about the effects of other sources of retirement income on portfolio composition of mandatory pension funds, which may help to explain differences in portfolio allocation across countries. Because the structure of benefits offered by first pillars could be seen as equivalent to a bond, in terms of individual wealth, contributors in countries with multipillar systems are expected to have a higher proportion of equity compared with countries with a single second pillar. The author also observes that the rate of contribution is an important factor explaining the portfolio allocation among countries, and therefore, two similar countries that differ only in terms of the contribution rate are expected to have different portfolio allocations if both aim to have similar replacement rates.

Viceira (observes that no fixed-income instrument is fully adequate for pension portfolios. Although cash instruments, such as Treasury bills, are a risk-free asset for short-term investments, they are not risk-free assets for long-term investors such as pension funds, because of the reinvestment risk and inflation risk. Although government long-term bonds provide protection against reinvestment risks, they do not protect the real value of the investments. Inflation is still a major threat to the value of assets in both developed and emerging markets. Therefore long-term inflation indexed bonds are the only true riskless asset for long-term investors.

Several key issues of asset management relevant to implementing optimal portfolios are addressed in the chapter. Although inflation-indexed bonds provide the safest investment option for working investors, in the absence of these instruments it is suggested that pension funds hold short term bonds denominated in foreign currencies in countries with stable inflation and real interest rates. In the case of equity, the author observes that the evidence about the long term benefits of investing in equities is not associated with a particular instrument but to international well-diversified portfolios. National equity markets are subject to country risk, and therefore excessive reliance on local equity markets imposes a risk on the value of the pension funds.

The question of currency exposure is also discussed. The conventional practice of fully hedging currency exposures is optimal only when excess returns to equity are uncorrelated with those to currency. However, currencies in emerging economies tend to be negatively correlated with the dollar and tend to appreciate when global stock markets fall. Therefore, contrary to conventional practice, pension funds in most emerging economies should keep unhedged positions in their equity exposure. The short-term volatility created by unhedged currency positions is more than compensated by the natural hedge and returns that are achieved in the medium and long term.

Chapter 7 concludes with an application of these concepts to an emerging economy and compares performance of multiple portfolios, including full investment in government bonds, full investment in domestic equity, full investment in global equity, and life-cycle pension funds. The analysis explores the benefits of inflation indexed bonds and international equity diversification, as well as the advantages of life-cycle funds over alternative strategies such as constant positions along the life-cycle and lifestyle pension fund line. The analysis shows that life-cycle funds do not perform worse and in most cases perform better than alternatives, such as lifestyle funds, in terms of the expected asset accumulation at retirement and the volatility that they can provide. Simulations are run with nominal and inflation indexed instruments. In addition, the simulations suggest that the volatility of the resulting income is higher when nominal bonds (instead of inflation indexed bonds) are considered in the portfolio. The analysis is supported by numerous simulations that consider non-stochastic labor income, stochastic labor income uncorrelated with equity returns and stochastic labor income correlated with equity returns.

Viceira states that the optimal design of the glide path for life-cycle pension funds is sensitive to the risk tolerance of the plan participant. In particular, participants with low risk tolerance experience welfare losses if they are forced to adopt life-cycle funds with the average high equity allocations that are optimal for medium risk tolerance participants. This leads to the conclusion that, on the basis of risk tolerance, life-cycle funds dominate other strategies including lifestyle funds. The chapter further concludes that contributors can fully exploit the benefits of funded systems by having a well-designed asset portfolio allocation and, therefore, properly designed

default investment options that can reduce the risks and potentially improve the long-term expected asset accumulation of contributors.

The last chapter comprises four essays that summarize the views of some of the well-known experts on pension policy and pension fund management. They participated in a January 2009 seminar in Mexico City in which the research work from the partnership was presented and discussed. These commentaries are focused on factors that will influence the performance of pension funds and the future of optimal portfolio allocation in the context of the financial crisis.

In the first essay, Keith Ambachtsheer addresses the importance of well designed “retirement income systems.” He emphasizes the need to not only develop effective asset management methods but also to create institutions that are able to deliver value to their stakeholders, noting in particular the need to better provide for the payout of benefits in retirement. He views the financial crisis as revealing weaknesses in portfolio strategies but in the overall effectiveness of pension systems. Olivia Mitchell similarly focuses on the need to effectively define the desired outcome and measurement metrics for pension systems. She notes that consumption smoothing is ultimately the purpose of any pension system and identifies the challenges attendant to measuring consumption and integrating this into system outcome metrics. She views the recent financial crisis as revealing a variety of challenges before pension policy makers, including holding down fees and expenses, creating system designs that are consistent with the level of financial literacy among their members, implementing the pay-out phase and effectively managing portfolio risks.

Luis Viciera’s commentary provides practical advice about how to effectively implement life-cycle strategies in funded systems. After emphasizing the importance of controlling costs and creating a proper institutional design for pension funds, he outlines the limitations of standard performance measurement methods when they are applied to pension funds. This provides a foundation for exogenously designing meaningful long-term benchmarks for pension funds. He suggests the creation of expert panels to define these benchmarks.

The final commentary, by Zvi Bodie, initially emphasizes the theoretical appeal of the life-cycle approach to portfolio design, but then moves on to outline the practical challenges in implementing such an approach. He concludes that the benefits obtained from the life-cycle approach are unlikely to warrant the costs and complexity, suggesting instead that the relatively simple approach of investing in inflation-indexed bonds would potentially achieve similar net results.

<<A>> Policy Implications of the Research Findings

The research highlights the potential to improve the effectiveness of pension funds to achieve their ultimate objective of providing income replacement in retirement by

developing portfolio strategies that adopt a long-term horizon and consider the influence of a range of human capital and other preferences in the formulation of asset allocation strategies. These optimal portfolios could provide a useful benchmark to evaluate the performance of fund managers that would considerably improve the value of performance measurement in relation to the methods now used that are derived from evaluation of other types of investment management with very different attributes from pension funds. Without portfolio design and performance measurement criteria that are explicitly derived from consideration of the particular nature of pension funds, the theory and evidence presented in this volume indicate that reliance on market competition with minimal criteria for investment strategies will not result in an investment portfolio that will effectively achieve the goal of consumption smoothing and income replacement.

This suggests the need to find a better balance between the role of the market and the role of the government in enhancing the performance of pension funds and reducing the risks of pension shortfalls due to inefficiencies in portfolio allocation.

Consequently, governments and their pension supervisors should consider a more active role in evaluating and proposing the long term objectives of pension funds for various categories of workers and defining benchmark portfolios that can be used to guide the design of funds, facilitate choice among funds, and provide more meaningful performance evaluation. This could lead to important improvements in establishing default options. Although this imposes a more explicit responsibility on governments (because they will share in the pension outcomes), the increase in responsibility is largely illusory.

Simply offering a large number of lifestyle pension funds might not be enough to achieve the full potential of funded retirement savings arrangements because most individuals do not have the capacity to understand the complexities of intertemporal asset allocation, which may take into consideration various parameters, including age, human capital risk, other sources of revenue, and risk aversion. Furthermore, cost considerations need to be addressed. In this context, collective schemes offer a balanced alternative to some countries. Even more so, lifestyle pension funds may also misguide individuals about their portfolio decisions, because an asset allocation considered to be aggressive at certain age can be considered conservative at a different age. Significant gains can accrue from providing individuals with appropriate benchmarks that enable them to evaluate the performance of the funds offered in relation to a strategy that considers a broader scope of relevant factors. For example, in the case of mandatory collective schemes, investments do not rely on the financial literacy of individuals, but on investment professionals with well aligned incentives.¹⁴ Given the well-documented limitations of the majority of participants in funded pension systems to interpret financial performance information and make choices consistent with their need to manage risks and achieve optimal levels of

¹⁴ Collective systems have the additional advantage of requiring changes in the contribution rates, depending on the performance of the funds.

retirement income, default choices are essential to the operation of a pension system that offers individual choice. The experience of countries with mandatory lifestyle funds shows that individuals tend to rely heavily on default options.¹⁵

The evidence provided in this volume demonstrates that the technical aspects of determining the strategic asset allocation of the default options impose a difficult, but not impossible, task. The main challenge is likely to be to ensure that any performance benchmarks are created without political interference. One approach that merits consideration would be to utilize a body of independent experts, with enough resources to conduct analytical studies on the strategic asset allocation for pension funds, to define optimal strategies and the associated benchmarks for different characteristics and attributes of workers. The benchmarks would be expected to be set for long periods but may need to be reviewed if major changes in investment markets occur. The easiest way to design benchmarks for life-cycle funds would be to connect them to the retirement age of different cohorts. To reflect the heterogeneity in the risk tolerance of individuals belonging to the same cohort, it would be necessary to define a limited number (two or three) of benchmark portfolios for each cohort.¹⁶

This would require the adoption of a risk-based approach to supervision and necessitate a strong reliance on reliable disclosure to market participants to provide simple and reliable signals to individuals about the funds best matching their requirements and the performance of those funds. Because the performance of pension funds would be measured relative to the benchmark, the supervisory authorities would need to have in place a mechanism that would allow them to measure the risks of the pension fund system in a comprehensive manner.

The welfare analysis proposed by Bagliano, Fugazza and Nicodano in Chapter 6 can be translated into the design of a traffic light system for monitoring the performance of pension funds. The traffic light system is one of the simplest ways of encouraging proper market surveillance of pension funds. Traffic light systems are easy to understand but require clear parameters and explicit models that can identify the risks of the portfolio allocations that differ from the benchmarks.¹⁷

Pension funds would be assigned a rating (color) that reflect their performance and the risk management capacity of the pension funds managers. Green light pension funds are those that have a portfolio structure aligned with the benchmark and have a

¹⁵ For example, in Chile, about two thirds of contributors have opted for the default option since lifestyle funds (multifunds) were introduced in 2002. In Sweden about 90 percent of new entrants are selecting the default options.

¹⁶ As the number of benchmarks increases, the capacity to compare funds decreases.

¹⁷ On a more restricted basis, the Danish Financial Sector Authority applies a traffic light system to supervise life insurance companies and pension funds in Denmark. See Van Dam and Andersen (2008).

good risk management system. The yellow light pension funds are those with weaker risk management systems and a higher probability of deviating from the benchmark. Funds assigned a red light would be those with portfolio structures substantially different from the benchmark or with weak enough risk management that they would have a high probability of substantial deviations in the future. The supervisor should be empowered to impose restrictions on pension funds in the yellow and red zones and mandate improvements within a certain period of time. Pension funds in the red zone must present a plan for moving to the green zone and should not be allowed to bring in new contributors until they have addressed the deficiencies identified by the supervisor. Clients should be made aware when a pension fund migrates from one zone to another. In a more advanced model, these ratings would also be different in relation to individuals of different age or other attributes for the same fund.

In countries that chose individual DC-systems, people should be free to select the life-cycle portfolio that best accommodates their risk appetite, but the default options for individuals who do not opt for a particular pension fund should be carefully designed. Governments are encouraged to use age and scoring mechanisms to identify the default options for individuals who do not select a particular fund.¹⁸ It is unrealistic to assume that it is cost effective to design pension funds that may fit into the characteristics of each individual, but the benchmarks for the same cohort should provide a broad approximation to the individual's preferences. The development of the scoring method is an important challenge to allocate individuals into the different benchmarks.

In summary, governments should assume responsibility for setting up benchmarks that may optimize the expected pensions of individuals. Pension funds should compete on the basis of these benchmarks within a similar risk structure. This book addresses the challenges of constructing these benchmarks and the variables that should be considered. To some degree this will be determined by the availability of financial instruments: however, notwithstanding the level of financial market development these benchmarks should consider the following:

- a. The presence of other sources of retirement income, including the income from public retirement schemes.
- b. The age of individuals.
- c. The rate of contributions.
- d. The target replacement rate and its downside tolerance.
- e. A matrix of correlations between labor income and equity returns.¹⁹
- f. The expected density of contributions for different categories of workers.

¹⁸ Although some countries have moved in the direction of creating a role for financial advisors to advise contributors, the authors see that approach as more expensive and inefficient.

¹⁹ The correlation with the returns of other financial instruments might also be considered.

- g. Type of retirement income in the payout phase, in particular the risk tolerance of pensioners in the payout phase (for example, real fixed annuities, variable annuities, and phased withdrawals).
- h. A parameter that reflect the risk aversion of policymakers.

Introducing a system of performance benchmarks that are based on parameters that specifically consider the ability of the fund's investment strategy to deliver retirement income will significantly improve the efficiency of retirement savings. The optimal portfolios derived from this process can both serve as guidelines for default investment choices that are better aligned with the needs of different groups of participants and provide benchmarks that permit meaningful evaluation of the performance of fund managers. The use of pension investment performance benchmarks would represent one of the more important innovations in pension systems and further advance the increasing convergence of DB and DC designs.

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