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Are defined contribution pension schemes socially sustainable? A conceptual map from a macroprudential perspective

Abstract

If retirement income, provided by public and private defined contribution (DC) pension schemes, falls below socially acceptable standards, there is a political risk that consensus-seeker policymakers could yield to pressures to commit future fiscal revenues. These contingent liabilities, when incorporated in markets' expectations, are bound to create spillovers on sovereign risk, with negative feedback loops on the capital adequacy of banks and other intermediaries, owing to losses on government paper. Among the causes of reduced annuities out of final assets in DC pension funds is a shrinking equity risk premium, much lower than the values usually advertised by the industry or assumed by policymakers. From a macroprudential perspective, these contingent liabilities and their effects on sovereign risk should be taken into account in stress tests assessing banks' resilience to financial shocks as well as in financial education programs aimed at boosting pension funds' membership.

Keywords: pensions, equity risk premium, political risk, sovereign risk, stress test, financial education.

JEL Classification: D10, G23, H55, J14.

Introduction

From a macroprudential perspective, stress tests, aimed at assessing the resilience of bank systems facing macrofinancial shocks (Greenlaw et al., 2011), should include the effects, through the sovereign risk channel, of politically-driven contingent liabilities arising from socially unsustainable public and private pension schemes, even when they are financially sustainable because designed as definite contribution (DC) ones¹.

To counteract an unsustainable public debt to GDP dynamics, at the root of sovereign risk assessment by rating agencies, policymakers are bound to yield to pressures to modify *ex post* the rules of private DC or defined benefit (DB) pension schemes, in order to fix current fiscal gaps with the accumulated assets, leaving for the future how to deal with pension liabilities. An extreme measure is to legislate a shift of retirement savings from funded private schemes to public pay-as-you go (PAYG) systems, as indeed happened via outright nationalization of private pension funds in Argentina in 2008, and in Hungary in 2010 and, in a less extreme way, in Portugal in 2010² (EIOPA, 2011).

Private DC pension funds may be pressured, or even legislated, especially when they are in the accumulation phase, to finance long-term investment projects, in order to boost home country's growth. The potential opportunity cost could however be invoked to justify future compensatory public funds, with the aim of guaranteeing the same final asset to be annuitized that an unconstrained portfolio allocation would have allowed.

When retirement income, out of public and private DC pension schemes, falls below a socially acceptable level, because of insufficient lifetime contributions or of lower than expected yields on investment, consensus-seeker policymakers are bound to commit to debt-financed fiscal outlays. A proxy for this "adequacy gap", such as the change in long-term public pension expenditure³, is indeed the third indicator for comparatively stronger signaling power among twelve ones for the Fiscal Indicators index according to the IMF study on early warning systems on the fiscal sustainability risks, associated with a government's inability to roll over its actual and contingent liabilities (Baldacci et al., 2011).

From a macroprudential perspective, against the backdrop of an increasing shift to DC pension schemes across countries, a conceptual map of some of the main factors causing politically-driven contingent liabilities for public sector medium-term accounts and of feedback loops with sovereign risk is a first step to provide even rough quantitative estimates of the effects on bank systems resiliency.

The paper is structured as follows. Section 1 presents the case for a standard dynamic inconsistency argument: the *ex ante* financial sustainability of PAYG notional DC public pension schemes and

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¹ The paper does not consider the insurer's risk of a State selling protection to hybrid DC private pension schemes that guarantee predetermined returns on subscribers' investment, as proposed for instance in Grande and Visco (2010).

² The Portuguese Government, after grabbing the assets of Portugal Telecom pension fund in February, negotiated a voluntary agreement with the largest four private banks for the gradual transfer of their pension schemes to the social security system, not only for new employees, as already done in 2009, but also for already-retired bank employees. As acknowledged in IMF (2011), the authorities' main objective was to cover the identified fiscal gap, exploiting the ESA95 and GFSM 2001 accounting rules according to which the assets transferred in this context are recognized as revenue, without taking into account the additional long-term pension liabilities.

³ More precisely, expressed as in percent of GDP, is the change in projected expenditures 40 years ahead relative to the base year.

of DC private pension funds is not *per se* sufficient to avoid likely requests of remedial fiscal outlays when retirement income turns out to be too low for socially accepted “subsistence” levels. Section 2 examines the case for committing pension funds resources to long-term investments in real assets in order to boost economic growth. Section 3 discusses the evidence on the shrinking equity risk premium, that is the excess returns that would have been earned by individual workers enrolling in private pension schemes. Section 4 draws some implications from a macroprudential perspective on financial education and on stress exercises, taking into account also a potential too-big-to-fail issue, given the large size of (negotiable) assets of DB and DC private pension funds relative to domestic financial markets. The final section concludes.

1. Financially sustainable but socially unsustainable DC pension funds

A DC private pension scheme is by definition financially sustainable, because the final asset, including the returns on contributor’s (and his employer’s, for an employee) investments, is actuarially equivalent to the present value of annuities over the expected retirement period. A PAYG pension scheme, like the ones introduced in Sweden and Italy in the Nineties and in Poland in 2003, is financially sustainable because it mimics a DC private pension scheme, but only up to a point. The key difference is that financial sustainability is jeopardized if the contractual return rate, which is not a market one but is determined by a law provision, is unrelated to the effective GDP per capita growth, which is the basic determinant of the contributing capacity of active workers. In addition, annuities can be computed with lagged data for life expectancy, disregarding the likely upwards trend (for the Italian case, see COVIP, 2011). Canada and Sweden, to enforce financial sustainability, have introduced an automatic adjustment mechanism, that reduces pensions (in Sweden) or also raises contributions (in Canada) whenever the actuarial asset is lower than the liability (Yermo, 2011).

Replacement rates for PAYG notional DC public pension schemes, that is the post-retirement income, expressed as a percentage of a worker’s pre-retirement income, are however projected to fall in next decades in the EU countries, even for full career workers (Grech, 2010). To make things worse, the initial condition of these projections is one of financial fragility for people in retiring age. In the EU-15, for instance, the elderly (65+) have a higher risk-of-poverty rate – below 60% of median equivalized income after social transfers – than both children and working age population (20% against respectively 18% and 15% between 2005 and 2008)

(EPC-SPC-EC, 2010). In Italy, with a reformed public pension system broadly endorsed by the EU Commission for its financial sustainability, the net (i.e., taking out income and payroll taxes) replacement rate, out of public notional DC pension schemes, under the best assumption of regular contributions on average work income during the standard 35-40 years long working full career, decreases from 82 per cent in 2010 to 71 in 2060; it falls from 95 to 57 per cent for self-employed ones (MEF, 2011). In the Australian experience of DC private pension funds, ‘there are a number of groups with relatively low levels of superannuation who need further assistance and encouragement to save if they are to achieve even a modest standard of living in retirement’ (Clare, 2008, quoted in Wise and Ntalianis, 2011, p. 19).

The transfer of financial risk on subscribers of funded private DC schemes may result in annuities, computed given the market value of accumulated contributions in the final year, below socially acceptable standards, even under the assumption of universal membership of active workers in non-mandatory schemes¹. There can be several causes: a shortened contribution period and/or low contributions, because of a late employment and/or an early exit from the labor market and/or a working career with several discontinuities. In addition, the assumption of an universal participation of all active workers is far stretched in non-mandatory schemes, especially for the younger ones facing a projected shrinking replacement rate out of the first (public) pillar, in the World Bank taxonomy (World Bank 1994). For instance, in Italy, the coverage is of only 23% of workers in 2010; the percentage falls however to 17% for 35-years old or younger workers (COVIP, 2011)². Among the causes of a low coverage are liquidity constraints, low financial education, scanty returns in recent years. In Italy, for instance, since they were instituted in 1999 and up to 2010, the occupational pension funds and open pension funds have achieved average annual returns (net of management fees and taxes) of 3.1 and 2.3 per cent respectively, almost a half of the average return on government bonds (Bank of Italy, 2011).

Replacement rates, out of public and private pension schemes, below a socially accepted “subsistence income”, undermine the credibility of a no-recourse to public finances simply because DC private and notional DC public schemes should be financially-

¹ Within the 34 OECD countries, nearly half have some type of mandatory private pension arrangement, mainly of the defined contribution type. Among the countries with mandatory and quasi-mandatory private DC schemes are Sweden, Poland, Mexico; the USA, the UK, Germany, Italy, Canada fall in the voluntary camp (OECD, 2011).

² These estimates are actually upward biased, because the numerator includes all pension plans, even if a single worker has subscribed several plans.

sustainable *ex ante*. Both public and private (but legislatively mandated and tax-incentived) schemes are in fact liable to a political risk – a textbook case of dynamic inconsistency – when consensus seeking overwhelms financial stability in the utility function of short-sighted policymakers. As put it by Grech (2010, p. 2): ‘There is an increasing risk that if the pension system does not fulfill public expectations, and/or older people find that they did not make appropriate saving and working decisions, the State could be forced by voters to reverse reforms and spend more on social transfers’.

2. Pension funds as long-term investors in real assets

Unsustainable public debt dynamics can be counteracted through GDP growth. To this end, subscribers’ run-proof private DC pension funds could be picked by policymakers as growth-enhancing long-term finance providers, especially when in the accumulation phase, as it happens for funds started in Sweden and Italy at the end of the last century. Growth-enhancing finance could mean either direct investment – in firms’ controlling rights acquisitions or in project financing of infrastructures or in real estate – or delegated investment through mandates to private equity funds and start-up and other venture capital specialists. Compared to banks and other institutional investors, with short-term liabilities, up to the extreme case of sight deposits, unleveraged pension funds could commit resources on long-term investments, better able to incorporate technical progress and thus enhance total factor productivity, for reasons similar to those spelt out in the literature debating on long-sighted bank-centric systems vs short-sighted market-centric ones (e.g., von Thadden, 1995).

Traditionally, pension funds, as well as life insurers and mutual funds that operate in retirement savings systems, have been seen as sources of long-term capital with portfolios built around the two main asset classes (bonds and equities) and an investment horizon tied to the long-term nature of their liabilities. Against the backdrop of few truly long-dated bonds, of the waning risk-free asset status for government bonds, and of a shrinking equity risk premium (see section 3), the perspective of investing in infrastructure projects could be of interest both for debt constrained Governments and pension funds¹.

Interestingly, a recent OECD project (Della Croce et al., 2011) focuses on the role of institutional investors, such as insurance companies and pension funds, as investors in new infrastructure to be built,

rebuilt, and retrofitted. Infrastructure investments promote productivity and foster economic growth, while managing various environmental challenges. With few truly long-dated bonds and other long-dated assets, infrastructure is also a long-dated asset that matches the liabilities to pensioners and generates inflation-linked monetary income over a long period of time. In addition, the long-term investment horizon in principle would allow pension fund subscribers to take advantage of any illiquidity premium attached to long-term investments, and, by holding investments over the longer term, could also reduce turnover within portfolios, and thereby costs.

A scarcity of specialized operators and thin capital market segments are likely to make it however difficult to pursue the option of delegated investment, the one that would fit a separation between the task of a pension fund, acting as a principal, of collecting contributions and choosing portfolio strategic allocations, and the task of delegated investors (agents), who should manage resources under each investment line with own return-risk characteristics.

A direct investment option for portfolio allocation, when combined with an investment home bias, either because of regulatory or political constraints, so to restrict the geographical asset diversification of pension funds, would amplify the pressures on policymakers to divert funds to help firms or sectors in troubles. The likely consequences of disregarding a proper economic assessment of the profitability prospects on the accumulation of the final assets to annuitize would therefore justify potential requests by eligible pensioners for future compensatory public funds.

3. Equity risk premium and life cycle portfolio allocation

The empirical evidence over the last quarter of a century raises doubts on two building blocks for strategic portfolio allocation of pension funds: the equity risk is consistently shrinking and government bonds, issued by advanced countries, cannot be associated anymore with a risk-free asset status, as certified by rating agencies and incorporated in prudential regulation for institutional investors. One likely consequence of these developments is that young workers will be discouraged from the membership in private pension funds, unless tax benefits overwhelm participation costs and psychological ones, such as the rules on age before being eligible to benefit of accumulated contractual savings. On both accounts, political risks of contingent liabilities increase: an insufficient lifetime contribution to the second pillar of the pension system is bound to generate a reduced retirement income on top of the public one; tax expenditures to incentive membership imply lower fiscal revenues.

¹ It has been estimated that less than 1% of pension funds worldwide are invested in infrastructure projects, excluding indirect investment in infrastructure via the equity of listed utility companies and infrastructure companies (Della Croce et al., 2011, p. 11).

The main rationale, assumed as an unquestioned fact in the financial literacy literature (for a recent example, van Rooij et al., 2011) as well as in the pension funds regulation literature (Antolin et al., 2009), to advocate the membership in a private DC pension fund is the opportunity of earning the equity risk premium, defined as the difference between the total return rates of a stock market index and of a market index of government bonds, thanks to the reduction of participation costs to equity markets for an individual worker (Guiso et al., 2002). The equity risk premium prices the risk of a higher volatility of equity returns compared to bond ones. Indeed, the annualized realized equity risk premia relative to long-term domestic government bonds were equal, during the period of 1900-2011, to 3.5 percentage points on average in 19 financially developed countries¹, 4.1 in the USA and 3.6 in the UK; for the 19 countries, the standard deviation was on average - higher by two thirds – 17.7 vs 10.4 percent – for equities compared to bonds (Credit Suisse, 2012). Another stylized fact is that, in the USA, a positive annualized real return rate on equities is associated with a holding period of at least twenty years (Dimson et al., 2002)². These historical findings provide the underpinnings for the widely held assumption in the industry, and explicitly laid out also in policy papers³, that participating in private pension funds helps individuals to earn the equity risk premium, because their investment horizon as future pensioners is far longer than the minimum required holding period to earn positive real returns on equities.

112-years averages are however a poor guide to expected returns: recent statistics are indeed consistently smaller (Table 1). Over the 1987-2011 investment horizon, a time span fitting the minimum required holding period of twenty years for positive real returns on equities, the average realized equity risk premium was even negative, -1.9 per cent, considering bond and equity returns, converted into US dollars, in a portfolio diversified across 19 countries (0.2 in the USA and -0.7 in Europe). Average returns for bonds and equities converged in fact during a period of disinflation at first and of a stable and low inflation thereafter. This set of events raised considerably bond total returns, because of nominal interest rates falling in the early period and hedging properties against deflation subsequently, and of

opportunities for portfolio diversification in a period with several stock market crises.

Table 1. Realized equity risk premium vs. government bonds (annualized rates, %)

Periods	19 countries ^a	USA	Europe ^b	UK	Italy
2002-2011	-4.5	-4.7	-3.9	-2.4	-6.3
1987-2011	-1.9	0.2	-0.7	-0.6	-5.2
1962-2011	0.4	1.7	0.6	2.7	-2.5
1900-2011	3.5	4.1	3.7	3.6	3.5

Source: Credit Suisse Research Institute (2012).

Notes: ^aWeighted average. The weights to combine national performances are domestic market capitalization for equities and GDP for bonds. 19 countries represent almost 90% of global stock market value. ^bEurope includes 8 eurozone countries, the UK, Switzerland, Sweden, Norway and Denmark.

These findings differ dramatically from secular trends but cannot be easily dismissed invoking an eventual mean reversion for equity returns⁴, because they were computed over a holding period of quarter of century, long enough to be relevant for the investment strategy of a new subscriber to a pension fund.

After the subprime and the euro crises, doubts on the risk-free asset status of government bonds, issued even by the USA in the dollar area⁵ and Germany in the euro area – AAA, stable outlook, in the Standard & Poor's rating metrics – impair the second main underpinning of a life cycle portfolio allocation for pension savings, namely a stable classification of financial instruments by risk. In fact, according to a life cycle rule of thumb, the portfolio share in low risk-low return government bonds should rise with working age, in order to gradually dampen returns volatility typical of high-return equities while approaching the exit from the labor market. With null or even negative equity risk premia, an all-equity investment strategy does not appear therefore worthwhile, even in the early stages of a worker's career, compared to safer all-bond one, provided sovereign risk is negligible. In addition, and more fundamentally, these developments question the traditional and stronger rationale for subscribing to private DC pension funds, instead of relying only on public pension schemes, that offer the added benefits of economies of scale in transaction costs compared to smaller private funds.

Against the backdrop of a required protracted fiscal consolidation for most advanced countries, as a shield against markets' doubts on looming sovereign

¹ 19 countries, that include the USA and the UK, 8 eurozone countries, 3 other European ones, Australia, Canada, Japan, New Zealand and South-Africa, represent almost 90% of global stock market value.

² In the Italian case, not even a forty years holding period would be associated with a positive real return (Mediobanca, 2009).

³ The Irish Government Green Paper on Pensions, issued in 2007, reports assumed nominal equity risk premium estimates going from 4.5 to 7 per cent (Stewart, 2011).

⁴ Recent empirical evidence, using the same database of Dimson et al (2002), annually updated by Credit Suisse Research, for 17 countries over the period of 1900-2008, suggests half-lives, that is the period it takes for stock prices to absorb half of a shock, ranging from 2.1 years to 23.8 years; in many periods no significant mean reversion is found at all (Spierdijk et al., 2010).

⁵ The USA, for the first time, were downgraded by S&P in August 2011 and put in the watch list by Moody's in July 2011.

risks caused by the public debt to GDP ratio increase since the subprime crisis, tax expenditures aimed at boosting the membership in private pension funds, with implied losses in fiscal revenues, should therefore be closely assessed as to their effective effects on public sector accounts. Moreover, expectations on politically-driven contingent liabilities could in fact arise when pensioners realize that their investment in equity markets does not (more than) offset, so to attain an adequate retirement income, the reduced replacement rates offered by PAYG public pension schemes.

4. Implications for financial education from a macroprudential perspective

To promote young workers' participation in private pension funds adequate information is warranted not only on replacement rates with public pension schemes and on how to add annuities to the public retirement income, but also on the financial risks of public and private pension schemes, in particular through the politically-driven creation of contingent liabilities. The task of providing empirical content to this macroprudential perspective, admittedly requiring highly subjective, country-specific hypotheses, would be a natural follow-up of the focus on pension funds' role in financial stability pioneered in September 2004 issue of the IMF GFSR (IMF, 2004).

The implications of complex feedbacks between political risk in pension schemes and sovereign risk make it however a hard task to convey in a sufficiently simple way even to financially literate future pensioners.

Let us consider the issues, similar to too-big-to-fail (TBTF) ones for banks and insurance companies, looming for large DB or hybrid DC private pension funds, given the size of their (negotiable) assets relative to domestic financial markets. Assets of DB pension funds are larger than annual GDP in countries such as Norway or the Netherlands, or close to a half of GDP in countries such as the UK, the USA and Ireland. Assets of combined DB and DC private pension funds are above 60% of GDP and one sixth of total financial system assets is also in Australia and Switzerland (CGFS 2011b, Graph 1 and Table 2). Large DB or hybrid DC pension funds, with tens of thousands eligible pensioners, are bound to raise expectations of public money infusions in case their obligations could not be fulfilled. In addition, the authorities can be expected to provide a backstop to either DB or DC large pension funds, in order to let these long-term institutional investors act as contrarians, when sellers' herding increases liquidity risks in financial markets. Pension funds are indeed expected to be more risk taker compared, for instance, to other liability-driven institutional investors, like insurance

companies, because they do not face financial distress costs, being technically immune to default.

The financial risk borne by individuals when they become members of a private DC scheme and choose an investment option fitting their risk profile is bound to increase if the risk characteristics of key instruments, such as government and corporate bonds, become blurred, thus causing a likely greater reliance on fiscal outlays when the effective annuities are determined. Moreover, a higher political risk creates a negative feedback loop with sovereign risk, should the attempt to protect from the latter reduce the willingness to subscribe government bonds. The consequent higher State funding costs would in fact worsen the conditions for public debt sustainability.

Against the backdrop of a protracted fiscal consolidation – meaning *inter alia* a shrinking replacement rate out of PAYG pension schemes – as a prerequisite to fend off doubts on public debt sustainability in most advanced countries, a low coverage of private pension funds would increase the gap between (socially adequate) expected and effective combined retirement income. A first normative implication, namely that participation be mandatory, is likely to be however hardly implementable, exactly because fiscal consolidation means that the State is unlikely to be able to divert resources to ease liquidity constraints on potential (young) contributors. A second and more interesting implication for pension fund members, to be clearly focused on in financial education programs, is that non contractual life cycle savings should raise, in order to be able to shield a pensioner's standard of living from financial markets shocks lowering the assets to be annuitized; the more so when considering that a cautious assessment of the equity risk premium should dampen the expected returns on investments through DC private pension funds. Finally, requests for fiscal outlays should be resisted, because the likely negative feedbacks on sovereign risk would jeopardize also the financial stability of banks and other intermediaries, through mark-to-market losses in their government paper, as well as higher funding costs (CGFS, 2011a, b), with negative spillovers on economic activity.

Sovereign risk impacts on pension funds' expected returns, through the valuation channel of public and – via rating downgrade cascades – corporate bond holdings. Valuation effects on government bonds are particularly important because of the usual home bias for investment in domestic government bonds, be it customary and/or regulatory induced. The recent loss of the unanimous, among rating agencies, risk-free asset status for even the US government paper, combined with the effects of the likely reduced regulatory role of bond ratings, embedded in all financial reforms enacted or proposed after the subprime crisis, in the USA (Dodd-Frank Act) and

in the EU (following the recommendations in De Larosière, 2009), blurs the meaning of guaranteed or safer investment options offered by private pension funds. The loss questions also entrenched market practices relying on the widely held assumption of a “safe” bucket of investment grade bonds, where safe often meant that fund managers felt entitled to exempt themselves from a close examination of the credit risk embedded in the securities bought.

Regulators in charge of macroprudential supervision should, in their Financial Stability reports, published in about 80 countries as of 2011 (Cihák et al., 2012) and by now the main instrument to convey to the public as well as to the market operators on a regular basis an assessment of the main risks facing financial systems, aim at providing even rough estimates of contingent liabilities related to pension budget pressures out of public and private pension schemes. Regulators could take into account, possibly with triggering thresholds, contingent liabilities arising from the gap between socially accepted minimum retirement income and the one effectively provided combining DC public and private pension schemes, under different assumptions on excess returns of funds’ portfolios over government bonds. The “subsistence” total retirement income could be proxied by the means-tested government provided age pension. In addition, a distinction should be introduced, when evaluating the adequacy of private savings, between countries with voluntary rather than mandatory private pension DC schemes. The estimated contingent liabilities should be incorporated in long-term projection on public debt sustainability and assessed as to their effects on sovereign risk ratings, given the methodologies made public by the agencies.

Conclusions

Stress tests to assess the resilience of bank systems to macrofinancial shocks should consider, at least

conceptually, the political risk of contingent liabilities in public accounts, arising from the attempt of consensus-seeker policymakers to avoid that retirement income falls below a socially (at least in their electorate’s view) acceptable level. The likely increase in sovereign risk would impact on the capital adequacy of banks and other financial institutions, with negative feedback loops on the real activity.

There are two main conclusions to be drawn from the arguments supporting the claim of the rising importance of this specific political risk.

First, the basic message from a financial education standpoint is that non contractual savings during the working age should rise, to help offsetting the effects of financial shocks on the final assets to be annuitized. A cautious perspective on returns offered by the membership in DC private funds is warranted, to avoid disillusion on the standard of living, and consequent pressures on policymakers for remedial debt-financed fiscal outlays. A necessary analytical building block along these lines is a careful assessment of the expected equity risk premium for home and geographically diversified portfolios.

Second, in early warning systems on fiscal stance sustainability, budget pressures should take into account, possibly with triggering thresholds, contingent liabilities arising from the gap between socially accepted minimum retirement income and the one effectively provided combining DC public and private pension schemes, under different assumptions on excess returns of funds’ portfolios over government bonds. A promising approach to operationalize this conceptual framework could be to proxy the “subsistence” level with a means-tested government provided age pension.

References

1. Antolin, P., S. Blome, D. Karim, S. Payet, J. Peek, G. Scheuenstuhl, J. Yermo (2009). Investment regulations and defined contribution pensions, OECD Working Papers on Insurance and Private Pensions, No. 37.
2. Baldacci, E., J. McHugh, I. Petrova (2011). Indicators of Fiscal Vulnerability and Fiscal Stress, IMF Working Paper, No. 11/94.
3. Bank of Italy (2011). Annual Report for the year 2010.
4. Cihák, M., S.T. Sharifuddin, K. Tintchev, S. Muñoz (2012). Financial Stability Reports: What are They Good for? IMF Working Paper, No. 12/1.
5. Committee on the Global Financial System (2011a). The impact of sovereign credit risk on bank funding conditions, CGFS Papers, No. 43.
6. Committee on the Global Financial System (2011b). Fixed income strategies of insurance companies and pension funds, CGFS Papers, No. 44.
7. COVIP (2011). Relazione Annuale sul 2010.
8. De Larosière, J. (2009). High level group on financial supervision in the EU Report, European Commission.
9. Credit Suisse Research Institute (2012). Credit Suisse Global Investment Returns Yearbook.
10. Della Croce, R., F. Stewart, J. Yermo (2011). Promoting longer term investment by institutional investors: selected issues and policies, *OECD Financial Market Trends*, Issue 1, pp. 1-20.
11. Dimson, E., P. Marsh, M. Staunton (2002). *Triumph of the Optimists: 101 Years of Global Investment Returns*, Princeton: Princeton University Press.

12. Economic Policy Committee – Social Protection Committee – European Commission (2010). Joint Report on Pensions – Progress and key challenges in the delivery of adequate and sustainable pensions in Europe.
13. EIOPA (2011). Financial Stability Report 2011 – Second half-year report.
14. Grande, G., I. Visco (2010). A public guarantee of a minimum return to defined contribution pension scheme members, *Bancad'Italia Temi di discussione*, No. 762.
15. Grech, A.G. (2010). Assessing the sustainability of pension reforms in Europe, London School of Economics, CASE, Working Paper, No. 140.
16. Greenlaw, D., A.K. Kashyap, K. Schoenholtz, H.S. Shin (2011). Stressed Out: Macroprudential Principles for Stress Testing, Conference draft, for the U.S. Monetary Policy Forum.
17. Guiso, L., M. Haliassos, T. Jappelli (2002). *Household portfolios*, Cambridge: MIT Press.
18. IMF (2004). Global Financial Stability Report, September, Ch. 3.
19. IMF (2011). Portugal: Second Review under the Extended Arrangement, IMF Country Report, No. 11/363.
20. Mediobanca (2009). The Italian stock-exchange 1928-2009: some analysis, Milan. http://www.mbres.it/sites/default/files/resources/download_en/2009_commento_eng.pdf.
21. Ministero dell'Economia e delle Finanze (2011). Le tendenze di medio-lungo periodo del sistema pensionistico e socio-sanitario, Rome, Rapporto No. 12.
22. OECD (2011). Pensions at a glance 2011.
23. Spierdijk, L., J. Bikker, P. Van der Hoek (2010). Mean reversion in international stock markets: an empirical analysis of the 20th century, *De Nederlandsche Bank Working Paper*, No. 247.
24. Stewart, J. (2011). The Pension System in Ireland: Issues and Reform. School of Business, Trinity College, Dublin, <http://www.lehigh.edu/martindale/documents/Stewart.pdf>.
25. van Rooij, M., A. Lusardi, R. Alessie (2011). Financial Literacy, Retirement Planning, and Household Wealth, Center for Research on Pensions and Welfare Policies Working Paper, No. 119/11.
26. von Thadden, E.L. (1995). Bank finance and long term investment, *Review of Economic Studies*, 62 (4), pp. 557-575.
27. Yermo, J. (2011). The unavoidable role of private pensions in retirement income systems, *BBVA Research Working Paper*, No. 11/11.
28. Wise, V., M. Ntalianis (2011). Financial structure and policy of Australia's retirement system, *Banks and Bank Systems*, 6 (2), pp. 15-22.
29. World Bank (1994). *Averting the Old Age Crisis*, Oxford: Oxford University Press.